APPENDIX I

NOISE MODELING TECHNICAL REPORT

Contents

Tables

Exhibits

Attachments

NOISE MODELING TECHNICAL REPORT

This report provides detailed information related to the noise results disclosed in **Chapter 3, Affected Environment** and **Chapter 4, Environmental Consequences.** The report includes a discussion of the methodology used in preparing the noise analysis and the statistical information used in the development of the modeled noise levels. It also contains information related to the impact of noise on people located within the study area. The organization of this document focuses on key assumptions and constraints affecting the overall noise analysis, the noise modeling process, and the noise analysis results.

1. KEY ASSUMPTIONS AND CONSTRAINTS

For this analysis, the following were key modeling assumptions and constraints prior to developing the model input data:

- Modeled conditions for all scenarios must reflect the concept of an "average annual day" (AAD). As defined in 14 CFR Part 150, data collected for noise modeling input that reflect airport activity and operational data must indicate, on an annual average-daily basis, "the number of aircraft, by type of aircraft, which utilize each flight track, in both standard daytime (0700-2200 hours local) and nighttime (2200-0700 hours local) periods of both landings and takeoffs."[1] The AAD provides the best representation of the typical long-term (365 days) average conditions for each airport or airspace system. The condition is defined by the number and type of operations, routing structure, runway use, aircraft weight, and weather. All scenarios must be modeled using a yearly average to insure an unbiased comparison among alternatives.
- The flight schedules developed and used for the Noise Integrated Routing System (NIRS) analysis maintained the same percentage of operations and fleet mix as the radar sample. The NIRS schedules reflected an average annual day condition that involve only Instrument Flight Rules (IFR) planned flights and include overflights as well as representative military flights. Visual Flight Rule operations were not modeled.
- The Baseline and Future conditions flight schedules were based on operational data collected via the FAA's Air Traffic Airspace Lab and Enhanced Traffic Management System (ETMS) data, Official Airline Guide schedule data, and other supplemental sources of data. For more information on how the flight schedules were developed please refer to **Appendix D**.
- For Baseline condition (2004), runway use and day/night distribution for the NIRS modeling were primarily provided by the radar data collected by the FAA's Air Traffic Airspace Lab.

[1] *14 CFR Part 150.* Sec. A150.103(b).

The lab combines actual real-time data provided by both Automated Radar Terminal System (ARTS) data and ETMS to provide a single source of flight data. The future scenario runway use component relied upon similar percentages based on the Baseline condition data as well as a review of traffic schedules and expected use of the airport to support future operations. The day/night distribution for all future scenarios was derived from the forecast flight schedules developed in the operational forecasting analysis (see **Appendix D**).

- The study area boundaries within which noise modeling was conducted were defined by two cylinders centered at CLE and DTW. The cylinders were then combined to form the oblong region displayed in **Exhibit 1** below. This image also shows the relative position of the airports included in the study. These boundaries determined the extent of the population data that was used, as well as the extent of modeled flight track definitions. A maximum altitude of 12,000 feet mean sea level (MSL) bounded the study area, based on FAA policy to model traffic to 10,000 feet above ground level (AGL) as indicated in FAA Order 1050.1E.

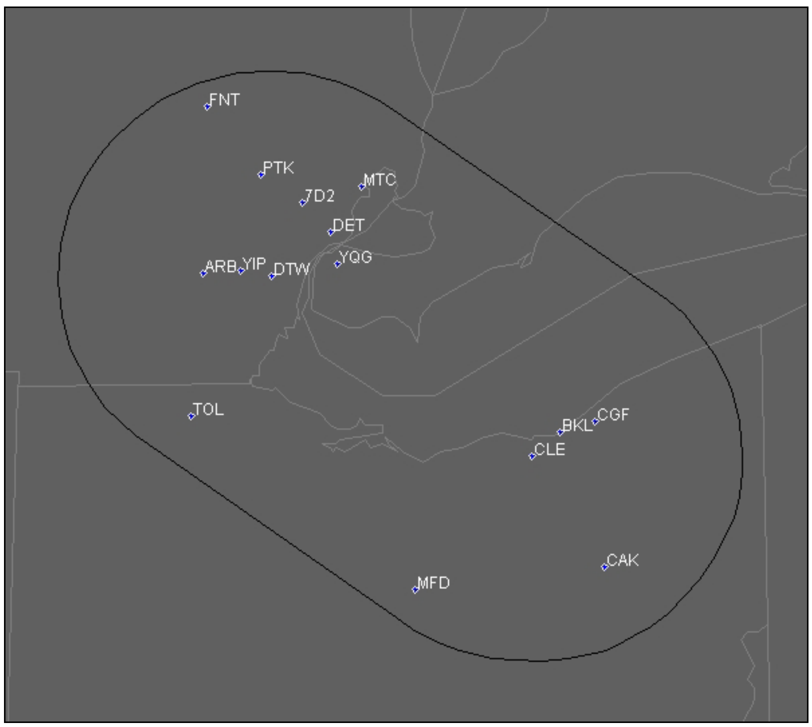


Exhibit 1: CLE/DTW Study Area and Modeled Airports

Various forms of design data were supplied by the airspace design team to describe current and future conditions. MITRE's Terminal Area Route Generation, Evaluation, and Traffic Simulation (TARGETS) tool and other Geographic Information System (GIS) applications were used to describe route structure. Route assignments were defined by the MASE Reroute Table. The analysis evaluated primary operating airspace configurations for CLE and DTW; however, they did not account for a full annual average day condition at all 15 airports in the study. Additional information regarding traffic streams to and from specific runways was developed for each airport in order to adequately cover the average annual day condition.

2. NOISE ANALYSIS OBJECTIVES

The CLE/DTW airspace is unique because of its location between the New York Metropolitan and Chicago regions of the country. These regions create unique challenges for CLE and DTW as they manage and merge complex, interacting traffic flows into and out of the overhead flight streams. The Environmental Study Area includes fifteen airports with multiple layers of controlled airspace involving two major TRACON facilities, one military facility, and one Air Route Traffic Control Center (ARTCC). Due to the size of the Environmental Study Area, the number of aircraft entering and exiting the Environmental Study Area airspace, and the numerous runway use patterns, thousands of representative NIRS flight tracks were modeled within the Environmental Study Area. The following sections describe the noise analysis objectives that ensure a detailed and accurate assessment of noise exposure modeling. The process of meeting the following objectives is discussed in **Section 4** of this document.

2.1 Noise Model

For purposes of this study, a detailed noise analysis across the Environmental Study Area was considered appropriate. Due to the expected size and complexity (number of flight tracks, aircraft operations, configurations, etc.) of the study, the FAA-approved regional noise model, NIRS is being used in modeling cumulative noise exposure. The NIRS model is described in more detail in **Attachment E**.

The FAA's NIRS model provides a detailed tool to evaluate the effects of airspace changes from ground level up to the maximum study altitude over noise sensitive areas. Information to be disclosed in the Environmental Assessment (EA) is outlined in FAA Order 1050.1E and includes the number of people within predefined day/night sound level (DNL) noise exposure ranges and any resulting net increases or decreases in the number of people exposed to those levels of noise for the various airspace scenarios.

2.2 Compute Average 24-hour Noise Levels

For aviation noise analysis, the FAA requires that the 24-hour cumulative noise energy exposure of individuals to noise resulting from the operation of airports be established in terms of yearly day/night average sound level (DNL) as stated in FAA Order 1050.1E, "Environmental Impacts: Policies and Procedures," and FAA Order 5050.4A, "Airport Environmental Handbook." Therefore, the DNL metric is the primary noise descriptor for this EA.

The DNL metric averages the total amount of noise energy produced in a 24-hour period. However, to account for the greater annoyance caused by a noise event at night (when people are trying to sleep and ambient noise levels are lower), the DNL metric imposes a penalty for nighttime noise. This is accomplished by requiring that the sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime) be augmented by 10 dB. The 10 dB weighting equates roughly one night flight to ten day flights by the same aircraft. The DNL levels are calculated by adding the computed Sound Exposure Levels (SELs) of individual aircraft operations that affect a given location during a 24-hour period and weighting nighttime events by 10 dB. Further information on the development and use of the DNL metric can be found in **Appendix H**.

For each of the noise modeling scenarios, the yearly average DNL levels were calculated for each of the population locations (centroids) within the Environmental Study Area. These points were based on 2000 U.S. Census data. Each NIRS input file contained specific airport operations, including runway use and day/night distributions. Total noise exposure for each input file at each centroid location was calculated. Using exposure levels from each file, the noise levels are annualized (log-added) at each centroid, which results in an annualized DNL level.

Additional noise-exposure calculations were performed for locations in noise-sensitive areas, including DOT Sec303/4f sites. These areas were covered either by individual or regularly-spaced arrays of grid points in the sensitive areas. The noise exposure in these areas was determined in the same manner as for population locations. The grid points served primarily as indicators of noise exposure at locations that do not have nearby population locations in the 2000 U.S. Census data. See **Section 3.3.11** for definition of the grids that were used for this analysis.

2.3 Model All Typical Traffic Routes Over Entire Environmental Study Area

In order to meet the AAD requirements, all significant routes that can occur over a year were identified and modeled. Radar data was collected from portions of March, April, October, and November 2004. In total, 80 days of radar data were acquired and used. For each operation, the radar data provides a record of the operator and type of aircraft, the time of the operation, the origin and destination cities, the flight path flown and the altitude profile for the operation. Modeled tracks were created from the radar data. These modeled routes were used for both the baseline and future No Action conditions. For the future proposed alternative, the TARGETS airspace analysis in conjunction with additional configuration information provided by the airspace designers was used to make necessary adjustments to the future No Action routes to reflect the alternative design where appropriate. Some routes in the alternative design are the same as the future No Action and therefore were not adjusted. Additionally the new Simultaneous Offset Instrument Approach (SOIA) for CLE runway 06R/24L have been included in the future No Action and purposed alternative scenarios. Furthermore for the future, No Action 2011, and purposed alternative 2011 scenarios, it was expected that the extension to CLE's 06R/24L runway would be completed.

2.4 Model Aircraft Procedure Profiles with ATC Altitude Control Points

Aircraft within the Environmental Study Area operate in accordance with standard air traffic control procedures. To model traffic in baseline and alternative airspace scenarios, NIRS would typically use standard arrival and departure profiles, defined in the FAA's Integrated Noise Model (INM) database, from the ground to 3,000 feet above field elevation (AFE). Above 3,000 ft AFE NIRS would either maintain the standard profile or could follow a custom profile. The NIRS User Guide describes how NIRS supports profiles.

For CLE and DTW, a detailed review of flight profiles was performed. During the review of the arrivals to both airports, several altitude steps downs or level offs were identified where aircraft approached their respective airports. When arrival flight profiles below 3,000 feet AFE were reviewed more closely, a level flight segment was identified. After comparing the standard profiles below 3,000 ft AFE with actual radar data it was determined that custom profiles below 3,000 feet AFE would be required to properly account for noise conditions at both airports. After careful review with the environmental offices in the Air Traffic Organization (ATO), it was determined that custom profiles would be used below 3,000 feet AFE. For the 2004 baseline case, profiles were also customized above 3,000 AFE to represent current altitude restrictions, hold downs, and steps currently practiced at each airport. These custom profiles were also included in the future No Action and Alternative scenarios.

Level flight segments for arrivals to the other 13 study airports were also considered. The radar data showed that level flight segments were generally at 3,000 AFE or above. These level flight segments were represented in NIRS with a level flight segments at 3,100 AFE. The length of the level flight segment was determined for each airport and based on radar data analysis.

2.5 Evaluation of Noise Level Changes Due to Alternative Scenarios

Airspace scenarios consist of one baseline scenario for the current condition, two scenarios for No Action and Alternative airspace conditions in 2006, and two scenarios for No Action and Alternative airspace conditions in 2011. This provides one data set to express current conditions and provides a total of four data sets that will be modeled for noise impacts, as follows:

- 2004 Baseline condition – existing airspace and routes
- Interim 2006 No Action – projected 2006 airspace and routes without redesign
- Interim 2006 Alternative
- Future Year 2011 No Action – projected 2011 airspace and routes without redesign
- Future Year 2011 Alternative

As required by FAA Order 1050.1E, the difference in DNL between the future No Action and a proposed future Alternative, of the same timeframe, defines the term "change" in this analysis (i.e. compare 2006 Alternative to 2006 No Action and compare 2011 Alternative to 2011 No Action). The method used to identify change and the degree or threshold of such change is described in **Section 3.2.6**.

2.6 Identify and Quantify Noise Impact Changes and Causes

The change in DNL at each location between future No Action and the proposed alternative airspace scenarios was quantified and reported for each population centroid location. In areas where any substantive changes in noise exposure occured, an analysis was conducted in order to provide a more detailed explanation of the changes. FAA criteria for changes are defined in **Section 3.2.6**.

2.7 Noise Modeling Quality Control

Noise modeling philosophy focuses heavily on precise locations and altitudes to ensure noise exposure calculations for locations on the ground are reasonably accurate and precise. In order to verify that the No Action conditions were modeled correctly and that the alternative design was interpreted correctly and modeled as accurately as possible, an extensive review effort was undertaken. This process involved integration of TARGETS modeling output, the No Action NIRS flight tracks and profiles, and the airspace alternative design documentation to evaluate each of the differences between the alternative defined in TARGETS and the No Action NIRS routes. The process involved an in depth review with the FAA's design team. The result was a thorough understanding of the future No Action airspace and the design elements of the alternative.

Other elements of consistency checks involved NIRS input development and detailed review of NIRS results. Flight routes and the corresponding profiles were evaluated to verify that dispersion and altitude profile calculations were made correctly. NIRS output quality assurance checks included operation level throughput to verify all operations entered into the model were accounted for in the output. Other key elements such as runway use and day/night distribution were also verified. Finally, in addition to the population centroids, noise levels were also computed at some 115,000+ grid points throughout the Environmental Study Area. These points included densely spaced points near CLE and DTW airports, as well as evenly distributed points throughout the entire Environmental Study Area. The noise results and noise changes at these grid locations provided a means of investigating anomalous results and assisted in the quality control of the final noise modeling.

3. NOISE MODELING METHODOLOGY

The following sub-sections describe the model used in the analysis, the data required for input into the model, noise model development procedures, and the output formats from the modeling process.

3.1 Aircraft Noise Assessment

The aircraft noise exposure tables presented in Chapter 3 and Chapter 4 of the Environmental Assessment were prepared with NIRS in accordance with FAA Order 1050.1E, "Environmental Impacts: Policies and Procedures." Section 14.5.e states:

> For air traffic airspace actions where the study area is larger than the immediate vicinity of an airport, incorporates more than one airport, or includes actions above 3,000 feet AGL, noise modeling will be conducted using NIRS. For those types of studies, NIRS will be used to determine noise impacts from the ground to 10,000 feet AGL. This noise analysis will focus on the change in noise levels as compared to populations and demographic information at population points throughout the study area. Noise contours will not be prepared for the NIRS analysis.

Prior to the development of NIRS, limited technology was available to examine noise impacts associated with high-altitude regional airspace changes. For a summary of NIRS capabilities please refer to **Attachment E**.

To support NIRS analysis, four categories of input data are required: general or local study data, airport runway use, area population and grid location information, and flight event/track data.

General Study Data: NIRS requires general information about the study to perform the noise calculations. Environmental Study Area information such as the coordinates of the center of the study, the length and width of the Environmental Study Area and the altitude ceiling of the study are necessary inputs. Also required is climatology data such as average annual temperature, average annual barometric pressure, and average annual humidity.

Airport Runways and Runway Use: Runway end coordinates for each runway at the study airports needs to be entered into the study. Also required are the elevation of the runway ends, and the length of each runway. Additionally the user can specify runway use or runway configuration weightings. These weightings allow the model to account for annual conditions at each airport contained within the study.

Population and Grid Location Data: Users input population centroid identification, location, and population counts. Typically these are referred to as population centroids and are center points of U.S. Census blocks. A census block is a subdivision of a census tract, and a block is the smallest geographic unit for which the Census Bureau tabulates data. Many census blocks correspond to individual city blocks bounded by streets, but blocks – especially in rural areas – may include many square miles and may have some boundaries that are not streets. Users can also input grid information to create user-defined grids to receive additional noise information for noise-sensitive areas. Using the population centroids, NIRS is able to output both population exposure and impact reports and graphics. Change of noise exposure for each point in the Environmental Study Area is evaluated based on FAA guidance and local requirements to determine the degree of the change in noise exposure. Also, where possible, NIRS assists in the identification of the principal source of the change in exposure.

<u>Flight Event/Track Data:</u> Each flight is made up of two types of information. Flight events include such data as flight identification, origin/destination, time, runway, and airframe/engine type. Flight tracks provide the geometry of the fight in a series of points that define latitude, longitude and altitude. Flight tracks are general or average tracks, sometimes referred to as backbones, also specify dispersion data which includes information about the number of sub-tracks, the weighting of the sub-tracks, and the distance between the sub-track and the center track.

NIRS also includes a special capability to fly custom altitude profiles. With this component NIRS allows the user to specify four different altitude controls along the track. These controls are:

- No altitude control – or fly the standard profile
- Fly to a specified altitude or higher
- Fly to a specified altitude
- Fly to a specified altitude or lower

The user of NIRS has two choices when defining the flight profile characteristics for flight tracks. By default, if no altitude controls are specified NIRS will use the standard profiles as they are defined within the NIRS/INM performance database. When the flight track represents a departure, NIRS uses the aircraft performance data and settings required to fly the profile specified in the flight track up to 10,000 feet AFE. Above 10,000 feet AFE, NIRS uses the maximum climb thrusts to reach the final altitude. For flight tracks representing arrivals above 6,000 feet AFE, NIRS uses a straight-line geometric descent as defined by the user. Below 6,000 feet AFE, NIRS uses the NIRS/INM aircraft performance data to fly the standard profile to the runway.

When altitude controls are specified in the flight track, NIRS simulates a standard profile for all aircraft below 3,000 feet AFE. When a flight track contains altitude controls greater than 3,000 feet AFE, NIRS will simulate the aircraft performance in order to meet the designer's specified altitudes.

3.2 Modeling Procedures

This section presents an overview of the input data and analytical methods used to develop the NIRS noise modeling for this EA study.

The NIRS model processes flight-track and operation data through several major steps: input development, data quality assurance, calculation of flight dynamics (thrust and speed), noise exposure computation, annualization of noise exposures, change of exposure analysis, and report generation. Key aspects of this processing are discussed below.

3.2.1 Input Data

Prior to running NIRS, the required input data was developed in one of two ways. For CLE and DTW the input data was developed and integrated using the Airspace Design Tool (ADT), a proprietary pre-processing application with integrated tool-sets that allow for radar data analysis, traffic flow identification, NIRS backbone and dispersion analysis, and flight schedule assignments. For the satellite airports the input data was developed using Geographic Information Systems (GIS) tools and other commercial programs. The information was then imported into NIRS in the required traffic file format. The CLE and DTW NIRS traffic files were divided by operation, runway, and day/night. Satellite airport NIRS traffic files were typically categorized by operation, although the development of each file did consider runway use and difference between day and night operations. Airport definition data, population centroids, grid points, and terrain data was also imported into the NIRS study.

3.2.2 Model Input Data Quality Assurance

After quality assurance checks previously described in **Section 2.7** were performed, the pre-processed input was put through the NIRS Flight Segment Generator (FSG) function, which reviews the profile and operation components within each input traffic file. Flight tracks and events are compared to verify that basic geometry and aircraft performance characteristics can be met. The output of this procedure serves as the input to the noise calculation process. Furthermore, a manual check was made to confirm flight tracks matched the backbones entered into the model, that operation counts (output) met expected counts (input), and that modeled fleet mix tables were consistent with the noise modeling assumptions.

3.2.3 Calculation of Flight Dynamics

As described in the NIRS User Manual, calculation of flight dynamics takes place in the FSG function of the model.[2] The program combines the databases that correlate aircraft performance and noise level data for each unique aircraft type with the designed flight tracks, altitude profiles, and the number of operations for each aircraft. The necessary data is provided by the traffic input files and unique aircraft type performance databases, which are standard not only for NIRS but also for the INM. FSG begins with each entire route and breaks it up based on the state of flight (i.e., takeoff, max-climb, acceleration, etc.). The engine power settings or thrust component for each flight segment are then calculated based on the same algorithms used in INM. The resulting file contains the necessary flight paths with aircraft assigned to the paths and the thrust settings assigned to each unique aircraft as it operates along the flight path.

3.2.4 Noise Exposure Computations

With the necessary flight components (aircraft type, operation frequency, track location, altitude, speed, and thrust), the information is inputted into the NIRS noise-calculation engine to calculate noise levels at each specific population centroid and/or grid point. Noise levels were calculated

[2] *NIRS Noise Impact Routing System User's Guide-Version 6.0c*. Gulding, John and Dr. Terry Thompson. December 2001.

for each unique traffic input file. In order to arrive at an average annual noise level result, each resulting noise file per traffic file were combined, or annualized.

3.2.5 Annualize Airport-Based Noise Levels

For each input file, NIRS calculated noise exposures at all population centroids and grid points. Then NIRS utilized the annual use percentages associated with each flight event component to calculate the total annual noise exposure at each population centroid and grid point. For all scenarios, the annual use percentage of each component equals 100%, because ratios involving runway use and track utilization for each airport were inherit within each traffic file. The result of the annualization task was a net exposure due to the mixture of noise from each scenario component. A sample of a NIRS annualization tree is provided in **Exhibit 2**.

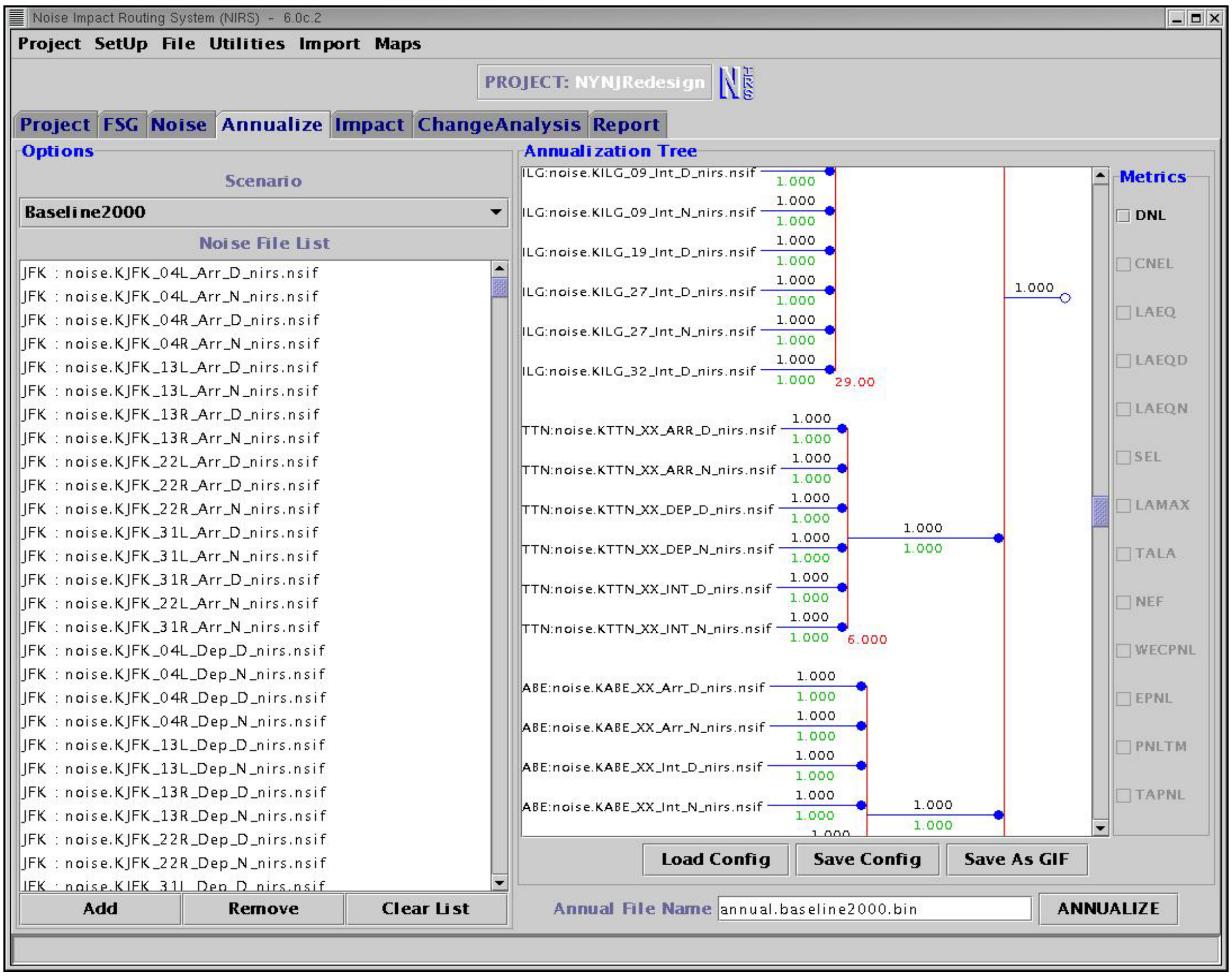


Exhibit 2: NIRS Annualization Tree Sample

3.2.6 Impact Analysis

After all noise calculations were completed, NIRS was used to determine noise impacts by locating and categorizing changes in noise values between scenarios. Using FAA scoring criteria, maps and tables depicting various types of change in annualized noise exposure between scenarios were produced for the entire Environmental Study Area.

The FAA established 65 DNL as the threshold above which aircraft noise is considered to be not compatible in residential areas. The FAA also determined that a significant impact occurs if a proposed action would result in an increase of 1.5 DNL or more on any noise-sensitive area within the 65 DNL exposure level.[3]

In 1990 the FAA issued a noise screening procedure for determining whether certain airspace actions above 3,000 feet AGL might increase DNL levels by five decibels or more.[4] The procedure served as a response to FAA experience that increases in noise of 5 dB or more at cumulative levels well below 65 DNL could be disturbing to people and become a source of public concern. In the Environmental Impact Statement for the Expanded East Coast Plan (EECP), the FAA evaluated noise levels down to the 45 DNL level for potential increases in DNL noise exposure of 5 dB or more. In the EECP study, the FAA determined that the 45 DNL level is the minimum level at which noise needed to be considered because "even distant ambient noise sources and natural sounds such as wind in trees can easily exceed this [45 DNL] value."[5]

In 1992, the Federal Interagency Committee on Noise (FICON) recommended that noise increases of 3 dB or more between DNL 60 and 65 dB be evaluated in environmental studies when increases of 1.5 DNL or more occur at noise-sensitive locations at or above 65 DNL. Increases of this magnitude below 65 DNL are not to be considered as "significant impacts," but they are to receive consideration. The FAA adopted FICON's recommendation into FAA Order 1050.1D.

For the purpose of this EA, increases of 3 DNL between 60 and 65 DNL are considered "slight to moderate impacts," as are increases of 5 DNL or greater at levels between 45 DNL to 60 DNL. The increase in noise at these levels is enough to be noticeable and potentially disturbing to some people, but the cumulative noise level is not high enough to constitute a "significant impact." FAA criteria are used to compare DNL changes at the population locations in the Environmental Study Area. For each scenario, all population in the Environmental Study Area is divided into three categories: (1) those receiving an increase in noise exposure relative to No Action equal to or exceeding FAA criteria; (2) those receiving a decrease equal to or exceeding FAA criteria; and (3) those having change less than FAA criteria. The rules defining the increase and decrease categories and the sources for each rule are presented in **Table 1**. Any location with noise values for the No Action and Proposed Action not meeting FAA criteria are not presented in Table 1 and are considered to have no change relative to FAA criteria.

3 FAA Order 1050.1E; 14 CFR Part 150 Section 150.21(a)(2)(d); FICON 1992, Pp. 3-5.
4 FAA Notice 7210.360. September 14, 1990.
5 *Expanded East Coast Plan – Changes in Aircraft Flight Patterns Over the State of New Jersey*. Federal Aviation Administration. 1995, pp. 5-9.

Table 1
Noise Impact Scoring Criteria

DNL Exposure with Proposed Action	Minimum Change in Exposure	References
< 45 dB	Not readily detectable above ambient	Air Traffic Noise Screening Procedure EECP EIS.[6]
45 - < 60 dB	+ / - 5 DNL (Slight to Moderate)	FAA Order 1050.1E/As above.
60 - < 65 dB	+ / - 3 DNL (Slight to Moderate)	FAA Order 1050.1E/FICON.[7]
>65 dB	+/- 1.5 DNL (Significant)	FAA Order 1050.1E/FICON.[7]

In addition to the areas meeting the above threshold criteria, the noise analysis for this EA also considered changes less than 1.5 dB, but entered or exited the DNL 65 dB area. In the case where the alternative had a noise exposure equal to or greater than 65 DNL, the no action noise exposure was less than 65 DNL and the difference between the alternative and no action noise levels was less than 1.5 dB, the location was defined as "Newly Impacted". Likewise if the alternative was less than 65 DNL, the no action noise exposure was equal to or greater than 65 DNL, and the difference between the no action and alternative noise levels was less than 1.5 dB, the location was defined as "Newly Relieved". While these "Newly Impacted" and "Newly Relieved" areas are not considered to be significantly impacted by the alternative because their increase was less than 1.5 DNL, they would reflect exposure to aircraft noise of either slightly greater or less than 65 DNL. As previously mentioned, FAA has determined that residential areas are not compatible with aircraft noise at or above 65 DNL. Thus, it is reasonable to identify these areas in order to provide a complete understanding of the noise changes resulting from the alternative airspace design.

Using a color-scheme consistent with NIRS, the following change summary table was created. All population locations receiving changes as determined by the FAA criteria are plotted, and each is colored according to its change category. Note "newly impacted" and "newly relieved" are not FAA criteria but are defined for this project. In conjunction with the mapping, a summary of the population impacts associated with the change analysis is provided. **Table 3** presents an example of the change analysis summary table along with the color scheme used for the mapping.

NIRS also provides a cross-reference summary matrix to analyze changes in population distribution within individual DNL ranges when comparing a No Action and alternative scenario. As shown in **Table 2,** the DNL ranges in the columns represent the No Action, while DNL ranges in the rows represent the alternative.

---

[6] *Expanded East Coast Plan: Environmental Impact Statement.* Federal Aviation Administration. Washington, D.C. 1995.

[7] *Federal Agency Review of Selected Airport Noise Analysis Issues*. Federal Interagency Committee on Noise. August 1992.

Table 2: Sample Population Impact Change Analysis Summary

	DNL Noise Exposure With Alternative			
	65 dB or higher		60 to 65 dB	45 to 60 dB
Minimum Change in DNL With Alternative	<1.5 dB	1.5 dB	3.0 dB	5.0 dB
Level of Impact	Newly Impacted	Significant	Slight to Moderate	Slight to Moderate
Noise Increases				
2006	0	0	0	0
2011	0	0	0	0
Noise Decreases				
2006	0	0	0	0
2011	0	0	0	0

Source: Metron Aviation, Inc. 2005

The following legend description applies to all of the matrices:

- The numbers highlighted light grey represent the number of people that have an increase in noise exposure to the next higher DNL range (i.e., moved from less than 45 DNL to 45-60 DNL) with the Proposed Action.
- The numbers highlighted in dark gray represent the number of people with a decrease in noise exposure to the next lower DNL range with the Proposed Action.
- The white boxes indicate the number of people expected to remain within the same DNL range with the Proposed Action.

Table 3: Sample Estimated Potential Population Change Table

Increase in DNL range
No Change in DNL range
Decrease in DNL range

		No Action DNL Range				
	DNL	**<45 (less than 45 DNL)**	**45-60 (between 45 DNL and 60)**	**60-65 (between 60 DNL and 65)**	**>=65 (equal to or greater than 65 DNL)**	**Proposed Action Total**
Alternative DNL Range	<45 (less than 45 DNL)	No Change	from 45-60 to <45	from 60-65 to <45	from >=65 to <45	Proposed Action Population by DNL Range
	45-60 (between 45 DNL and 60)	from <45 to 45-60	No Change	from 60-65 to 45-60	from >=65 to 45-60	
	60-65 (between 60 DNL and 65)	from <45 to 60-65	from 45-60 to 60-65	No Change	from >=65 to 60-65	
	>=65 (equal to or greater than 65)	from <45 to >=65	from 45-60 to >=65	from 60-65 to >=65	No Change	
	No Action Total	No Action Population Total by DNL Range				Total Environ-mental Study Area Population

Source: NIRS 6.0c3 User Manual, August 2005

The various colors have been assigned to the levels of change associated with a project alternative for ease of interpretation. Yellow, orange, red, and pink cover various degrees of alternative exposure for population receiving increases under the alternative; violet, blue, green, and light green cover various degrees of alternative exposure for population receiving decreases under the alternative. The following descriptions apply to the color scheme used in the noise change analysis:

Noise Increases

- Pink: Population centroids that the alternative had a noise exposure equal to or greater than 65 DNL, the no action noise exposure was less than 65 DNL and the difference between the alternative and no action noise levels of the same timeframe was less than 1.5 dB. – Newly Impacted

- Red: Population centroids that the alternative noise level was equal at or above 65 DNL and had an increase of 1.5 DNL or more compared to the no action of the same timeframe. – Significantly Impacted

- Orange: Population centroids that the alternative noise level was between 60.0 and 64.9 DNL and had an increase of 3.0 DNL or more compared to the no action of the same timeframe. – Slight to Moderate Impact

- Yellow: Population centroids that the alternative noise level was between 45.0 and 59.9 DNL and had an increase of 5.0 DNL or more compared to the no action of the same timeframe. – Slight to Moderate Impact

Noise Decreases

- Light Green: Population centroids that the alternative was less than 65 DNL, the no action noise exposure was equal to or greater than 65 DNL, and the difference between the no action and alternative noise levels of the same timeframe was less than 1.5 dB. – Newly Relieved

- Green: Population centroids that had a no action of 65 DNL or greater and experience a noise decrease of more than or equal to 1.5 DNL compared to the No Action of the same timeframe. – Significantly Relieved

- Blue: Population centroids that had a no action between 60.0 and 64.9 DNL and experience a noise decrease of 3.0 DNL or more with the alternative compared to the no action of the same timeframe. – Slight to Moderate Relief.

- Purple: Population centroids that had a no action between 45.0 and 59.9 DNL and experience a noise decrease of 5.0 DNL or more with the alternative compared to the no action of the same timeframe. – Slight to Moderate Relief.

Any population centroid that does not meet any of the above categories did not have a change in noise exposure relative to FAA criteria.

3.3 NIRS Input Data

This section describes the noise modeling input data and various assumptions.

As outlined in the previous sections, noise modeling requires several types of input and supporting data. All the input data types mentioned are required to be based on the local average annual day condition. This EA involved the collection of all such inputs for 15 airports, each involving multiple runways and users that operate within close proximity of each other. The information also required route descriptions that go beyond the airport environment and extend from the ground up to 12,000 feet MSL. Airport layouts within the Environmental Study Area are used as the source for runway descriptions. Operation levels, mix of different aircraft types (fleet mix), and airspace segment and stage-length (trip length) are based on the design day flight schedules developed for each planning horizon as part of the operational forecasting effort documented in **Appendix D.** Stage-length is a function of the distance between the origin and destination city. Typically, an aircraft flying the longer stage-lengths carry more fuel and are therefore heavier, resulting in a lower takeoff profile. For CLE and DTW, the stage-lengths for some aircraft types were adjusted based on climb-out performance displayed in radar data for those operations. This will be explained in more detail below. For the satellite airports, stage-length was determined strictly by the distance between the origin and destination city.

The inputs for the 2004 Baseline condition case were based primarily on radar data provided by the FAA. Radar data was collected from portions of March, April, October, and November 2004. In total, 80 days of radar data was acquired and used. For each operation, the radar data provides a record of the operator and type of aircraft, the time of the operation, the origin and destination city, the flight path flown and the altitude profile for the arrival, departure, and overflight operations.

For the 2006 future No Action scenario, flight tracks are identical to those used in the baseline 2004 scenario for all airports except CLE. In May 2005 CLE implemented a Simultaneous Offset Instrument Approach (SOIA) procedure. This new procedure allows for simultaneous approaches to be conducted on the closely spaced parallel runways with a ceiling of at least 1200 feet and a visibility of 3nmi. It was assumed that this procedure would also be available in 2006 and 2011 and was therefore included in both No Action scenarios. In addition the No Action 2011 scenario also included CLE's extension to Runway 06R/24L which will soon be under construction and is expected to be completed before 2011.

The No Action noise model input data served as the foundation for the alternative and was modified to reflect the procedural changes identified in the alternative design. In order to ensure that the alternative was interpreted correctly and modeled as accurately as possible, a collaborative review effort was undertaken. This process involved integrating the design output (from TARGETS) and the No Action NIRS flight tracks and profiles to evaluate each of the differences between the alternative and the No Action NIRS routes. The FAA's design team and the noise analysts reviewed the alternative on an airport-by-airport, route-by-route, and sometimes even a flight track-by-flight track basis. The result was a comprehensive understanding of the design elements of the alternative and detailed insight into the NIRS model input changes from No Action that would accurately reflect the design.

Details of the NIRS input data for the Baseline current conditions and the future No Action conditions are discussed below. The NIRS input modifications associated with the alternative airspace design are also discussed below and mentioned in the noise analysis results for the alternative.

3.3.1 Airport and Runway Data

Fifteen airports within the CLE/DTW Environmental Study Area were evaluated in this analysis. **Table 4** presents a listing of the 15 airports modeled in the NIRS noise analysis along with the runways modeled for each airport.

Table 4: Modeled Airports and Runways

Identifier	Airport	Modeled Runways
7D2 (VLL)	Oakland/Troy Airport	09, 27
ARB	Ann Arbor Municipal Airport	06,24
BKL	Burke Lakefront Airport	06L/R, 24L/R
CAK	Akron-Canton Regional Airport	01, 05, 19, 23
CGF	Cuyahoga County Airport	06, 24
CLE	Cleveland-Hopkins International Airport	06L/R, 10, 24L/R, 28
DET	Coleman A Young Municipal Airport	07, 15, 25, 33
DTW	Detroit Metropolitan Wayne County Airport	03L/R, 04L/R, 09L/R, 21L/R, 22L/R, 27L/R
FNT	Bishop International Airport	09, 18, 27, 36
MFD	Mansfield Lahm Regional Airport	05, 14, 23, 32
MTC	Selfridge Air National Guard Base	01, 19
PTK	Oakland County International Airport	09R/L, 27L/R
TOL	Toledo Express Airport	07, 25
YIP	Willow Run Airport	05L/R, 23L/R, 27L/R
CYQG	Windsor-Ontario Airport	07, 12, 25, 30

Source: Metron Aviation, Inc. Analysis – 2004

3.3.2 Environmental Variables and Terrain Data

The annual average weather calculated for this study was based on the historic weather reports made at Cleveland Hopkins International Airport (CLE) between 1997 and 2004. Both CLE and DTW weather over the time period was analyzed. Due to the use of weather information within NIRS, it was determined that CLE weather data should be used since it would produce more conservative noise results than DTW. The average annual temperature for the time period was 51.3 degrees Fahrenheit (10.7 degrees Celsius) and the relative humidity was set at 76.1%. The atmospheric pressure during the time period, 29.16 inches Hg (or 987.5 millibars), was used for the study. Finally, the NIRS default runway average headwind (8 knots) was used for each runway in the study.

The U.S. Geological Survey (USGS) provided terrain data that was also included in the NIRS analysis. NIRS computes noise at locations of interest within the Environmental Study Area. By default each location is identified by a latitude and longitude. In order to properly account for the distance between the source and the receiver, NIRS can take into account terrain data to associate elevation to all points within the Environmental Study Area. This means that each point of interest will include the correct two dimensional location as well as its elevation relative to MSL.

FAA Order 1050.1E specifies that for airspace actions such as this redesign project, NIRS will be used to determine noise impacts from the ground to 10,000 feet AGL. After a review of the terrain within the Environmental Study Area, it was determined that the ceiling for the NIRS analysis should be 12,000 feet MSL.

3.3.3 Operation Levels and Day/Night Distribution

Many aspects of this EA are based on the forecasts of future aviation activity. The determination of future air traffic requirements calls for activity levels to be expressed at the daily or hourly level. An efficient way to transition from the annual activity forecasts to the daily or hourly level is the use of the design-day flight schedule. Design-day flight schedules, which are very similar in content to any airline flight schedule, contain information about the type of flight, arrival and departure times, the origin and destination of the flight (domestic or international), the operator of the flight, the local airspace arrival and departure segments, and the aircraft type.

Design-day flight schedules were developed for 2004, 2006, and 2011. The design-day schedules used in the noise modeling represented an AAD level of operations. The Year 2004 schedule was based upon actual 2004 radar information supplemented with OAG data and ETMS data. The Year 2006 and Year 2011 schedules were developed based on the results of the system-wide forecasting effort conducted as part of the EA process. Fleet-mix information was developed during that effort and was based on factors such as airline orders and forecasted enplanements. Further details concerning the development of the forecast and design day schedules are provided in **Appendix D.**

Baseline Condition

The Baseline 2004 operational levels were determined for the Environmental Study Area overflights and each of the 15 airports as part of the operational forecasting effort presented in **Appendix D**. A product of the forecasting is the creation of an Average Annual Day Schedule or *AADS*. As mentioned above, the AADS includes information about flight operations such as time of day, origin/destination, and aircraft. Time of day is particularly relevant for maintaining correct nighttime proportions since the DNL metric's weighting of nighttime noise levels is increased 10 dB. In essence, one nighttime flight equates to ten daytime flights by the same aircraft. **Table 5** presents the Baseline average annual daily IFR operations modeled for each airport along with the time-of-day percentages.

For each entry in the AADS, the event was split proportionally and assigned to all the backbones that handled flights matching the key characteristics of the AADS entry. As a result, each event from the AADS was mapped in correct proportion to the runways and routes it would be expected to fly.

Table 5: 2004 Average Daily Operations and Time-of-Day Summary

Identifier	Airport	AADS Operations	Day-%	Night-%
7D2 (VLL)	Oakland/Troy Airport	12	100.0%	0.0%
ARB	Ann Arbor Municipal Airport	14	100.0%	0.0%
BKL	Burke Lakefront Airport	71	67.6%	32.4%
CAK	Akron-Canton Regional Airport	210	83.3%	16.7%
CGF	Cuyahoga County Airport	61	93.4%	6.6%
CLE	Cleveland-Hopkins International Airport	710	91.2%	8.8%
DET	Coleman A Young Municipal Airport	52	86.5%	13.5%
DTW	Detroit Metropolitan Wayne County Airport	1417	93.9%	6.1%
FNT	Bishop International Airport	154	86.4%	13.6%
MFD	Mansfield Lahm Regional Airport	48	97.9%	2.1%
MTC	Selfridge Air National Guard Base	74	94.6%	5.4%
PTK	Oakland County International Airport	181	90.6%	9.4%
TOL	Toledo Express Airport	164	62.8%	37.2%
YIP	Willow Run Airport	143	92.3%	7.7%
CYQG	Windsor-Ontario Airport	38	89.5%	10.5%

Source: 3/2004, 4/2004, 10/2004, 11/2004 Radar data & Metron Aviation, Inc. – 2004

Future No Action and Alternative Conditions

The NIRS modeling for the future conditions is largely based on the Baseline 2004 or current condition modeling. Noise modeling was developed for overflights and the expected IFR flight plan operations at the 15 airports identified as part of the study. The expected average annual day operational levels for 2006 and 2011 at each airport were derived from the operational forecasts presented in **Appendix D**. These forecasts also provided the time-of-day information in the form of operational schedules so that the nighttime operations could be identified. **Tables 6 and 7** presents the average annual daily IFR operations modeled for each airport along with the time-of-day percentages for future year 2006 and 2011.

Table 6: 2006 Average Daily Operations and Time-of-Day Summary

Identifier	Airport	AADS Operations	Day-%	Night-%
7D2 (VLL)	Oakland/Troy Airport	12	100.0%	0.0%
ARB	Ann Arbor Municipal Airport	14	100.0%	0.0%
BKL	Burke Lakefront Airport	73	68.5%	31.5%
CAK	Akron-Canton Regional Airport	220	84.6%	15.5%
CGF	Cuyahoga County Airport	61	93.4%	6.6%
CLE	Cleveland-Hopkins International Airport	733	91.5%	8.5%
DET	Coleman A Young Municipal Airport	52	86.5%	13.5%
DTW	Detroit Metropolitan Wayne County Airport	1538	93.2%	6.8%
FNT	Bishop International Airport	159	86.8%	13.2%
MFD	Mansfield Lahm Regional Airport	48	97.9%	2.1%

Table 6: 2006 Average Daily Operations and Time-of-Day Summary

Identifier	Airport	AADS Operations	Day-%	Night-%
MTC	Selfridge Air National Guard Base	74	94.6%	5.4%
PTK	Oakland County International Airport	185	90.3%	9.7%
TOL	Toledo Express Airport	161	62.7%	37.3%
YIP	Willow Run Airport	145	92.4%	7.6%
CYQG	Windsor-Ontario Airport	42	90.5%	9.5%

Source: Metron Aviation, Inc. - 2005

Table 7: 2011 Average Daily Operations and Time-of-Day Summary

Identifier	Airport	AADS Operations	Day-%	Night-%
7D2 (VLL)	Oakland/Troy Airport	12	100.0%	0.0%
ARB	Ann Arbor Municipal Airport	14	100.0%	0.0%
BKL	Burke Lakefront Airport	79	68.4%	31.7%
CAK	Akron-Canton Regional Airport	234	84.6%	15.4%
CGF	Cuyahoga County Airport	63	93.7%	6.4%
CLE	Cleveland-Hopkins International Airport	791	92.2%	7.9%
DET	Coleman A Young Municipal Airport	52	86.5%	13.5%
DTW	Detroit Metropolitan Wayne County Airport	1773	93.5%	6.5%
FNT	Bishop International Airport	169	85.8%	14.2%
MFD	Mansfield Lahm Regional Airport	50	98.0%	2.0%
MTC	Selfridge Air National Guard Base	74	94.6%	5.4%
PTK	Oakland County International Airport	193	91.2%	8.8%
TOL	Toledo Express Airport	167	61.1%	38.9%
YIP	Willow Run Airport	151	92.7%	7.3%
CYQG	Windsor-Ontario Airport	48	89.6%	10.4%

Source: Metron Aviation, Inc. – 2005

3.3.4 Aircraft Fleet Mix

Another key characteristic of the operational levels at an airport is the mixture of different aircraft types that make up the airport's total operations. This characteristic is often referred to as "Fleet Mix" and literally means the distribution of specific aircraft types (and sometimes specific aircraft/engine combinations) across the operations at an airport. This is an important element in the noise modeling process because even subtle variations in aircraft types can result in changes in noise levels.

Baseline condition

The mix of specific types of aircraft flown was developed for the 2004 AADS based on actual radar data supplemented by OAG and other forms of data. During input development for CLE and DTW, aircraft were grouped as follows:

1. H – Heavy Jet (turbo-jet aircraft weighing 255,000 pounds or more)

2. M – Large and Medium Jet (turbo-jet aircraft weighing between 15,500 and 255,000 pounds)
3. T – Large and Medium Turboprops (turboprop aircraft weighing between 15,500 and 255,000 pounds)
4. K – Small Jets (turbo-jet aircraft weighing 41,000 pounds or less)
5. P – Small Turboprops and Propeller (propeller aircraft weighing 41,000 pounds or less)

These categories were used to assist in identifying traffic flows that may be used primarily by unique aircraft categories.

Due to the fleet mix present in the satellite AADS, aircraft types were categorized differently than for CLE and DTW. For the satellite airports, during input development aircraft were grouped as follows:

1. J – Civilian Turbo-jet aircraft
2. T – Civilian Turbo-prop aircraft
3. P – Civilian Propeller aircraft
4. Mtac – Military Tactical/Trainer aircraft
5. Mtrans – Military Transport/Heavy bomber aircraft

As with CLE and DTW, these categories were used to assist in identifying runway use and traffic flows that may be used primarily by unique aircraft types.

NIRS provides a set of aircraft types in its noise engine to compute aircraft noise. Each aircraft type in the AADS was specified in terms of an airframe/engine combination consistent with the database maintained within NIRS. These types could vary depending on the type of operation. **Attachment B** at the end of this appendix is a table of the aircraft types with their appropriate arrival and departure NIRS aircraft type. Any non-standard mappings were approved by the FAA's Office of Environment and Energy (AEE) and are found in **Attachment C**.

Detailed tables that present operations levels by each aircraft category and time-of-day for each airport and runway are presented in **Attachment A** at the end of this appendix.

Future No Action and Alternative Conditions

Fleet mix categories for the no action scenarios are consistent with Baseline 2004. The fleet mix in the forecasted 2006 and 2011 AADS include projected changes in each airline's respective fleet mix as newer generation aircraft types are introduced and older models are phased out of service. Further details about changes to the fleet mix can be found in **Appendix D**.

3.3.5 Runway Use

The runway use percentages define which runways are to be used for arrivals and departures on an average annual basis. Generally, the primary factor determining runway use at an airport is the weather and prevailing wind conditions at the time of a flight. Additionally, several key secondary factors also have a strong influence on runway selection. These factors include interdependencies on traffic at other nearby airports, length and orientation of runways, runway safety issues (taxiing aircraft crossing active runways or Land and Hold Short-LAHSO rules), the current make up of the traffic (many arrivals or many departures), and even the flight's origin or destination.

Baseline condition

Runway use for DTW and CLE is primarily a function of entry and exit points for both airports and the origin and destination of a flight. The entry and exit points are often referred to as *fixes* and were used in determining which runways served which fixes. In the baseline condition scenario, fix/runway use was based on current radar data. If an origin/destination used a fix at least 70% of the time, all flights to that origin/destination would be assigned to that fix within the model. Otherwise, the origin/destination was split over the appropriate fixes as seen in the radar data. After the fix was assigned to the origin/destination for DTW, the radar data was used to determine specific runway use. For CLE, the specific runway use was computed differently due to the fact that construction was ongoing during the radar data time period. The primary fix assigned to an origin/destination was determined by whether the inboard (Runway 06R/24L) or outboard (Runway 06L/24R) runway was the primary arrival/departure runway.

For the satellite airports, runway use for each aircraft category group was estimated from the radar data. The runway use analysis was sub-divided for arrivals, departures, and touch-and-go operations and for daytime (7 AM to 10 PM) and nighttime (10 PM to 7 AM). In some cases there were few radar tracks within an operation group for a particular time period and operation type (arrival, departure, touch-and-go) and in these cases the total runway (regardless of time or operation type) for the respective operational group was used. In addition, some runways that had very small number of operations were removed from the analysis.

Detailed tables that present runway use proportions by each aircraft category and time-of-day for each airport are presented in **Attachment A** at the end of this report.

Future No Action Conditions

In general the runway use proportion modeled at each airport for the Baseline 2004 condition was held constant for the future No Action noise modeling. Some slight variations occurred due to changes in the future schedules and fleet mix as some origin/destinations changed and categories of aircraft operate more or less prevalently on specific runways. The detailed tables that present runway use proportions by each aircraft category and time-of-day for each airport are presented in **Attachment A** at the end of this appendix.

Future Alternative Conditions

This alternative included the movement of existing fixes and the creation of new fixes. These changes to entry and exit points within the Environmental Study Area defined a different mapping of origin/destination to fixes at the airports in the study. Using the MASE table, origin/destination-fix assignments were updated. The methodology used to determine runway use at CLE and DTW did not change between the future no action scenarios and the alternative scenarios for existing fixes. New arrival fixes and departure fixes for both CLE and DTW were assigned to runways based on review with the airspace design team and existing information found in the analysis of radar data and the current condition.

For the satellite airports, the proposed action was not expected to change runway use. As mentioned before, runway use is primarily dictated by wind conditions and runway length requirements. The runway use for the alternative conditions was the same as the no action case for the same time frame.

3.3.6 Flight Track Definitions

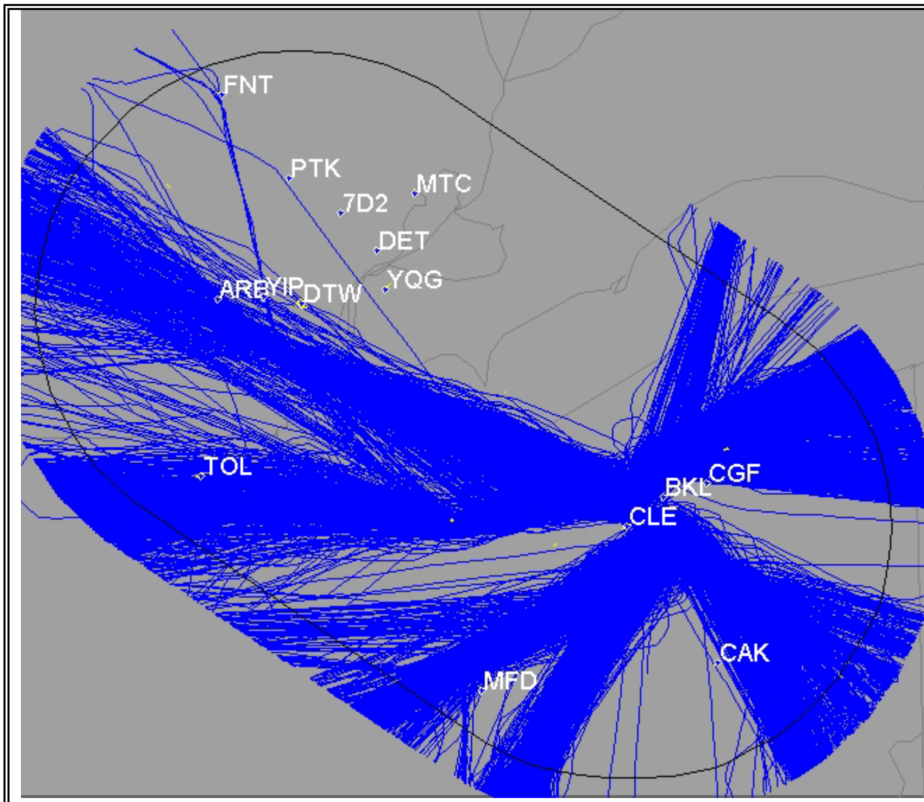
To determine projected noise levels on the ground, it is necessary to determine not only how many aircraft are present, but also where they fly. Therefore, flight route information is a key element of NIRS input data. Flight routes to and from an airport are generally a function of the geometry of the airport's runways and the surrounding airspace structure in the vicinity of the airfield. For this project an extensive effort was undertaken to ensure an accurate portrayal of flight routes both near the airport (terminal) and further out in the Environmental Study Area (en route). A flight track is the projection on the ground of an aircraft's path in the sky. Due to forces such as meteorological conditions, aircraft size and performance, origin/destination, vectoring instructions from air traffic controllers, and pilot judgment, tracks of different flights associated the same airport will differ. The differences in flight tracks is typically referred to as *dispersion* and must be accounted for in the noise modeling to account for average annual conditions. In addition to the lateral position of a flight, its vertical position is critical to noise calculations. The vertical position of a flight is generally referred to as the flight's *profile*. Flight profiles are affected by conditions similar to those that alter the lateral position of the flight track.

Flight tracks are reviewed into two ways, the terminal area segments (near the airport) and the en route segments (further out in the Environmental Study Area). Flight tracks are defined as arrivals, departures and overflights. The flight tracks extend from the airport runway to the study boundary. Additionally, overflights that crossed the Environmental Study Area and flew below 12,000 MSL were included in the analysis. In most cases these were either low altitude terminal en route flights or flights that approached or departed from an airport near the study boundary.

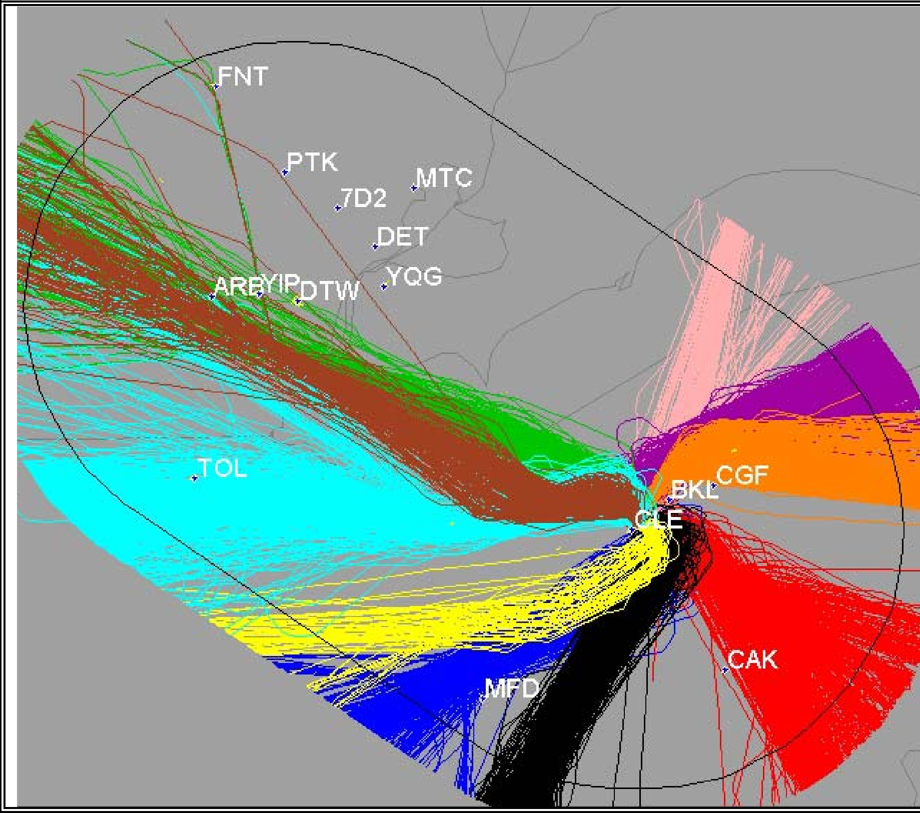
Baseline condition

ADT was utilized for the detailed analysis of the radar track data for CLE and DTW airports. The data was separated first by airport, operation type (arrival, departure) and then further divided by runway, day/night, and aircraft category (jet, prop). The tracks were then grouped using unique characteristics such as departure headings, arrival intersections, and altitude. Key arrival and departure fixes were also used to identify unique traffic flows. Once the traffic flows were identified, a statistical center track (or backbone) was calculated for each group based on the average mean of track density within each flow. A set of sub-tracks associated with each center track was also defined to depict the observed lateral dispersion of operations within a flight corridor. The width and density of the flow determined the number of dispersed sub-tracks within a corridor. The distribution of radar tracks within a corridor determined the percentage use or weighting of each sub-track.

Exhibit 3, Exhibit 4, Exhibit 5, and Exhibit 6 present an example of the methodology applied to identify and generate NIRS departure backbones for runway 06R in CLE. Each step shows a further refinement to the analysis that was applied and the resulting NIRS backbones that were generated. Note that the Oakland/Troy Airport, which is now identified by VLL, was formerly identified by 7D2.

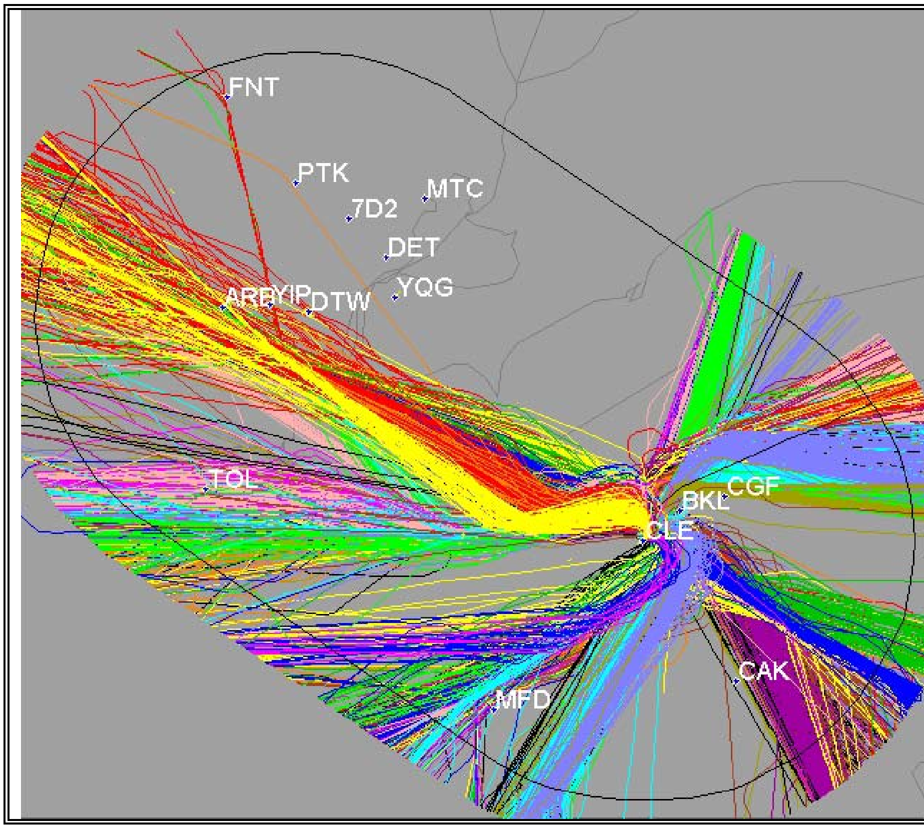


Radar data for 06R departures.

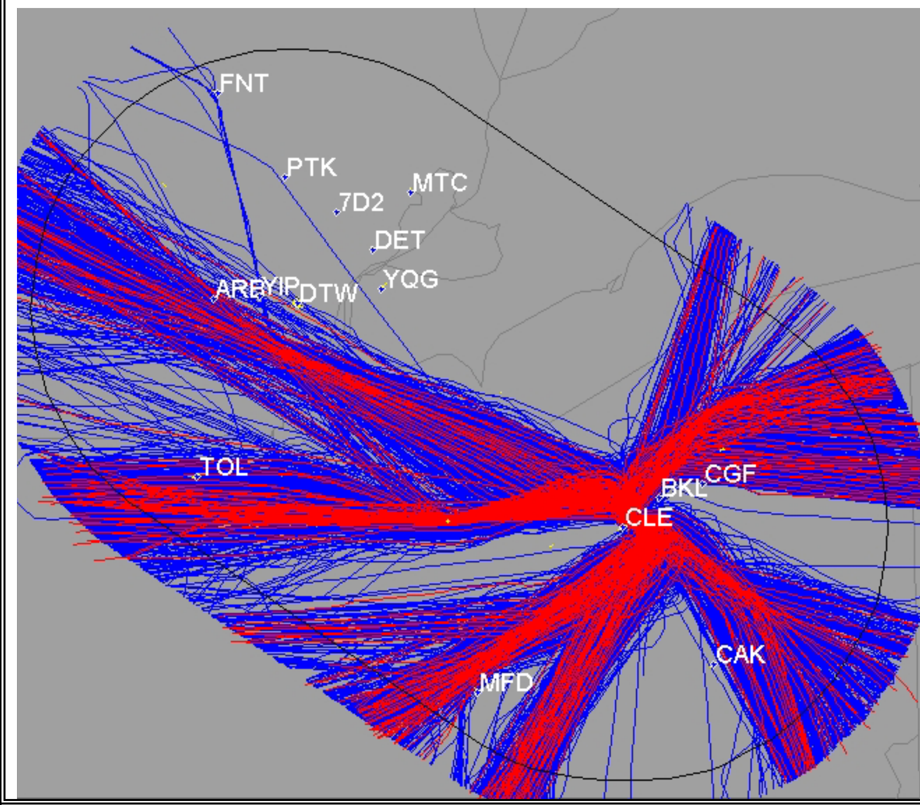


Radar data for 06R departures grouped by fix and en route flows.

Exhibit 3 & Exhibit 4 : Example Flight Route Identification Process



Radar data for 06R departures further divided by considering fix, en route flows, departure headings, profiles, aircraft types and time of day.



Radar data for 06R departures vs. NIRS backbones.

Exhibit 5 & Exhibit 6 : (continued) Example Flight Route Identification Process

For the satellite airports, radar tracks were assigned to a model flight track bundle. A model track bundle is a group of tracks associated with a runway and have the same general flight track, typically associated with one or more navigation points, within the Environmental Study Area. These model track bundles were used to develop the model flight tracks. The radar tracks for some of the satellite airports did not have many "returns" or points at lower altitudes and closer to the runways. Available automated model track generation routines with such input data would have created erroneous tracks. Therefore, a "visual" method was used to develop the model tracks. The outer bounds of the flight corridors were determined via visual inspection, and segments were classified as either straight or turns. The outer bounds were used to determine the position of the sub-tracks that represent the dispersions of radar tracks across a flight corridor. Most model flight tracks have nine sub-tracks, although some have seven or five. The sub-tracks were evenly spaced and operations were distributed across the various sub-tracks using a normal, or Gaussian, distribution. The Gaussian distribution is the INM default for dispersed model tracks and adds more operations to the center sub-tracks than to the outer sub-tracks

Due to the size of the Environmental Study Area, a unique category of flight tracks called "intra-study" routes were also built based on existing radar data. "Intra-study" routes are flights that depart and arrive at two airports within the study. The significance of a particular route between two study airports was determined based on the frequency at which the route was found in the radar data. These routes were then analyzed in a similar way as described previously and then split into an arrival and departure flight track.

The radar data analysis resulted in the development of some 25,000+ individual NIRS backbones and sub-tracks. These flight tracks along with the flight schedule were used to compute the baseline noise results.

Future No Action Conditions

For the 2006 future no action scenario, flight tracks are identical to those used in the baseline 2004 scenario for all airports except CLE, where in May of 2005 a closely spaced parallel simultaneous approach was implemented. The Simultaneous Offset Instrument Approach (SOIA) allows for a more efficient use of the airport by allowing flights to arrive on both parallel runways in poor weather conditions. The runway that is equipped for the SOIA procedures is the inboard runway (Runway 06R/24L). The outboard runway approach remains consistent with arrivals as seen in the baseline condition. The inboard runway's approach is offset from the runway to the south. When the aircraft is about 2.7 nmi from the runway end, it takes a 30 degree approach to the centerline of the runway. The aircraft should then be aligned with the centerline of the runway when it is about 1.4 nmi from the end of the runway. The simultaneous approach will be used in both 2006 and 2011. **Exhibit 7** illustrates the simultaneous approach for arrivals to runway 06L and 06R.

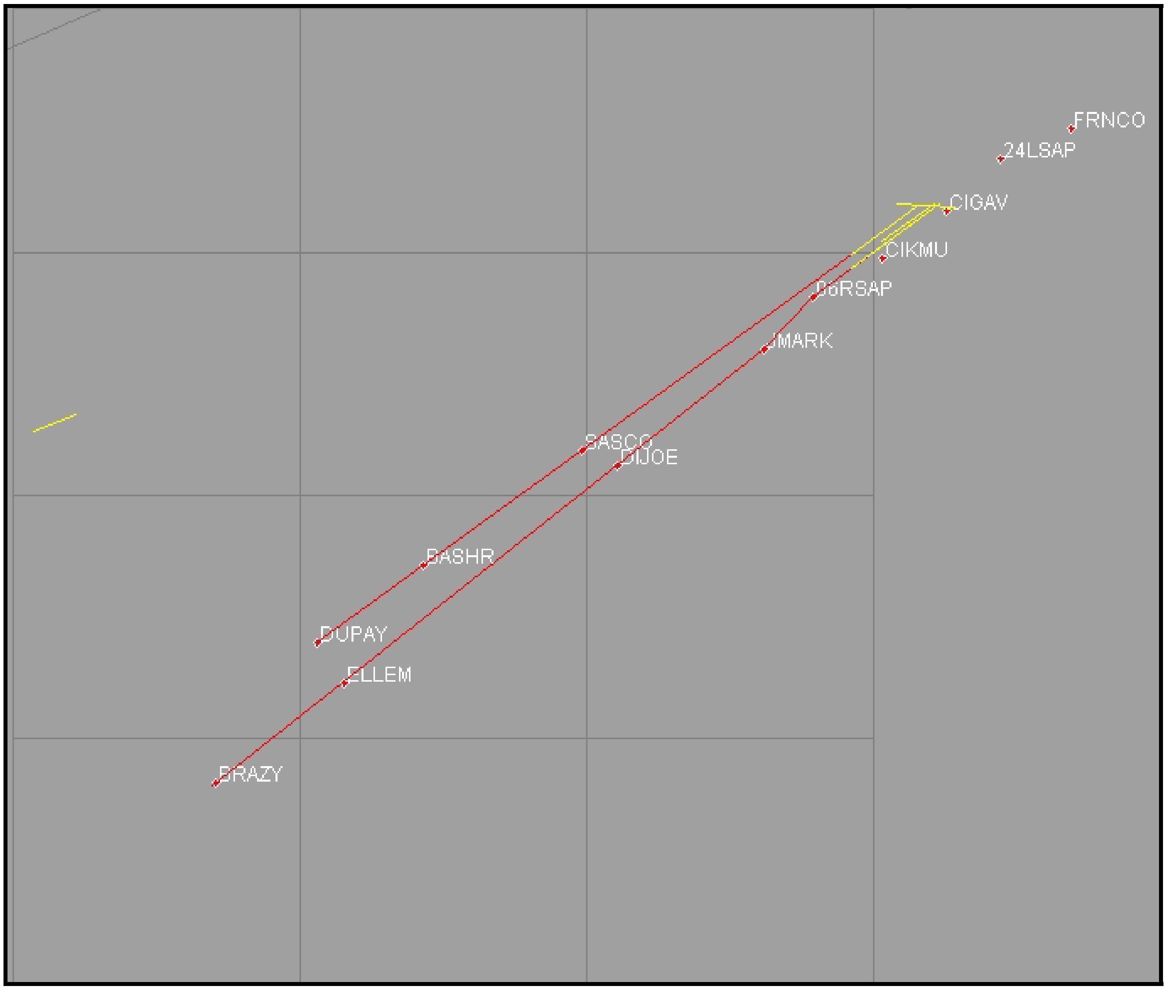


Exhibit 7 CLE SOIA Procedure for Runways 06R/06L

For the 2011 future no action scenario, the flight tracks are identical to those used in the no action 2006 scenario for all airports, except for CLE Runway 06R/24L. CLE Runway 06R/24L tracks were altered to take into account the runway extension that will soon be under construction and is expected to be completed by 2011. Through discussions with the airspace design team, the following flight track alterations were determined. Departures off CLE Runway 24L were shifted to the west by the difference between the old runway end and the new departure point. Arrivals to CLE Runway 24L were also shifted to the west by the same amount. Flight paths for CLE Runway 06R departures and arrivals will not change.

Future Alternative Conditions

Flight track definitions for the alternative were created based on TARGETS information prepared by the airspace design team. For CLE, traffic that departed to MFD in no action was primarily moved to depart over OBRLN and AMRST. For departures off Runways 06L and 06R, aircraft that turned right off the runway to depart to MFD now departs north off the runways and make a left turn to OBRLN and AMRST. In addition, flights to DTW and its satellites are shifted slightly to the northeast to depart via GEMNI and LLEEO instead of CETUS and JUNKR, respectively. Arrivals to CLE through GONNE were shifted to HIMEZ. In addition, arrivals that arrived over WAKEM in the no action case were shifted south to arrive over ABERZ in the alternative.

Traffic arriving DTW was shifted slightly northeast to arrive over GEMNI instead of CETUS as seen in no action. In addition, a new arrival fix, named WEEDA, was created. This new fix was created to ease the traffic strain from the southeast. The flight tracks for the new arrival fix were created by copying existing routes from CETUS and MIZAR. For departures, the east gates were slightly shifted. Hence, ERRTH, MOONN, and MARRS were created by shifting the TYCOB, HADAR, and WINGS traffic slightly to the north. In No Action HADAR was primarily a prop arrival fix. In the alternative HADAR has been replaced by MOONN and will be used for both jet and prop departures. Finally, SCORR and EARVN, which were primarily prop-only fixes in No Action, are no longer restricted and therefore will include jet traffic in the alternative.

The proposed action has little changes in the immediate vicinity of the satellite airports. Therefore, proposed action tracks were created by modifying copies of the baseline/no-action tracks. Small changes close into the airport reflect changes related to new headings used by aircraft between the immediate vicinity of the airports and the new routes.

3.3.7 Stage-Length

Stage-length is the term used in NIRS to refer to the length of the trip planned for each aircraft operation from origin to destination. The trip length is needed in noise calculations because it influences the take-off weight (and therefore the thrust and performance) of the aircraft, which is higher for longer trips and lower for shorter trips. The most direct arc on the surface of the Earth between the origin and destination, the great-circle distance (GCD), is typically used to calculate a stage-length for each aircraft operation. Seven categories for departure stage-length and one for arrival stage-length are used in NIRS, as shown in **Table 8**.

Table 8: NIRS Stage-Length and Trip Distance Summary

Stage-Length Category	Approximate Trip Distance (nautical miles)
Departures:	
D-1	Less than 500
D-2	500 to 999
D-3	1000 to 1499
D-4	1500 to 2499
D-5	2500 to 3499
D-6	3500 to 4499
D-7	Greater than 4500
Arrivals:	
A-1	Any Distance

Further review of the departure radar profiles showed that radar tracks did not accurately match standard flight profiles typically defined by stage-length or trip distance. Stage-lengths for CLE and DTW were customized for this project by comparing radar profiles for each aircraft operation – origin/destination city combination and the available NIRS stage-length profile. Depending on the comparison the stage-length that most closely matched was used for baseline, no action, and the alternative scenario. If an aircraft type for an origin/destination city combination did not exist in the radar data, but was in the schedule, a stage-length was assigned by reviewing other aircraft type within the same aircraft category. If that too was not possible, the great circle distance between the origin and destination determined the stage-length of that operation. As a result of this process, a specific stage-length was assigned to each aircraft origin/destination city combination for CLE and DTW. **Attachment D** found at the end of the appendix presents the stage-lengths used for each aircraft origin/destination city combination for CLE and DTW, respectively.

Operations arriving to or departing from the satellite airport use the standard NIRS method for assigning stage-lengths.

3.3.8 Aircraft Climb/Descent Profiles

In order to more accurately model noise exposure, NIRS has the capability to follow specified altitude restrictions incorporated into the input flight tracks. The modeled aircraft trajectory in NIRS can reflect altitude information provided by the airspace designer, rather than following a standard profile as is ordinarily done in INM noise studies. NIRS automatically generates profiles for each aircraft operation on each flight track that are consistent both with the specified altitudes and the NIRS aircraft-performance database. Four types of altitude control at points along the flight track can be encoded in NIRS input files, as follows: no altitude control; be at or above a specified altitude; be at a specified altitude; and be at or below a specified altitude.

Baseline condition

NIRS was designed to fly standard profiles between the ground and 3,000 ft AFE. Above 3,000 ft AFE, a custom profile can be followed or NIRS will continue to use the standard profile identified by the aircraft and its stage-length. For CLE and DTW, a standard profile below 3,000 ft AFE would not illustrate how aircraft arrive at the airports since arrival steps exist below 3,000 ft AFE. Hence, for CLE and DTW, profiles were customized, regardless of altitude. At higher altitudes, the profile followed the altitude controls in the NIRS flight tracks. All backbones were compared with standard profiles to determine whether custom profiles were needed. For the 2004 baseline case, profiles were customized to represent current altitude restrictions, hold downs, and steps currently practiced at each airport. Exhibit 6 shows a sample altitude profile as modeled in NIRS.

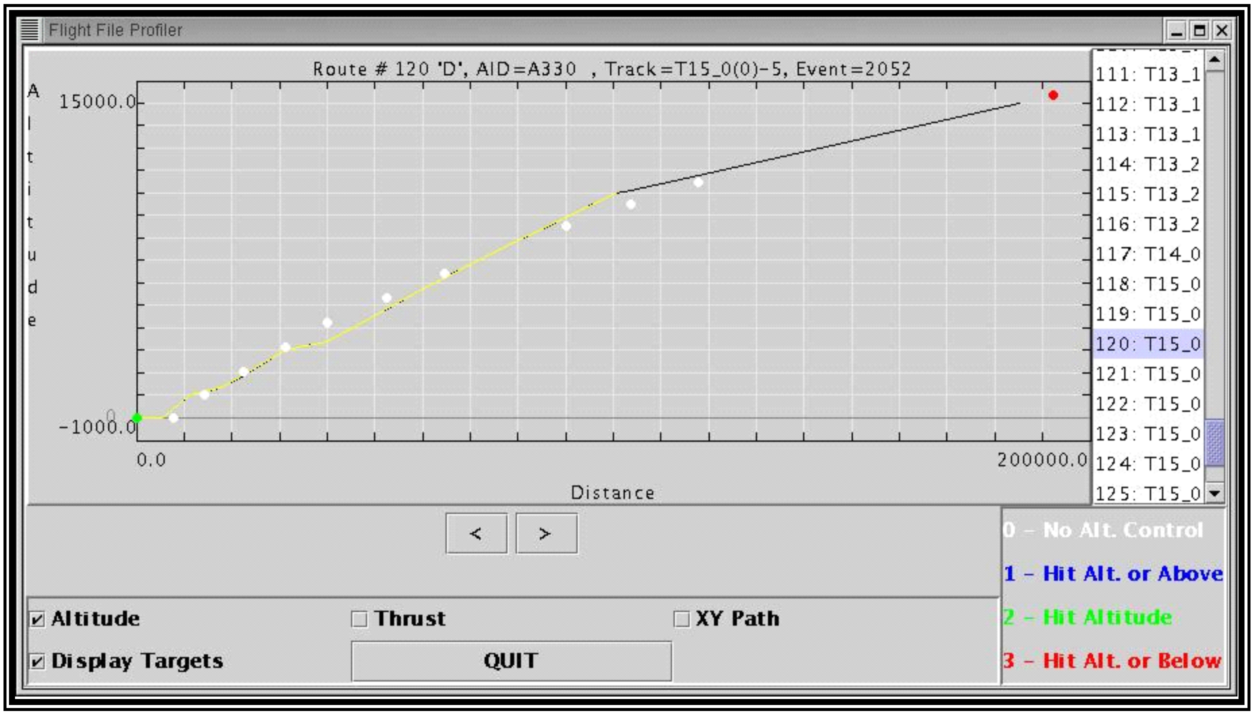


Exhibit 8: NIRS Sample Profile

Future No Action and Alternative Conditions

Flight profiles for the 2006 future no action scenario are identical to those used in the baseline 2004 scenario for both the primary and satellite airports.

For the 2011 future no action scenario, the flight profiles were also identical to those used in the baseline 2004 scenario for all airports, except CLE runway 06R/24L. CLE runway 06R/24L tracks were altered to take into account the runway extension that will soon be under construction and expected to be completed by 2011. Through discussions with the airspace design team, the flight track alterations were determined. With departures off CLE runway 24L being shifted to the west, aircraft approaching will be slightly higher than they are in 2004 and 2006. In the same manner, arrivals to CLE Runway 24L will approach slightly higher than they do in 2004 and 2006. Arrivals to CLE runway 06R will have no profile changes since the extended runway has the same arrival threshold. Departures off CLE runway 06R will depart slightly higher than they do in 2004 and 2006 because flight take-off roll will begin sooner due to the extension of the runway.

For satellite traffic, NIRS was instructed to allow departing aircraft to perform a standard climb (the default climb in the NIRS database for a particular aircraft type) until it approached the maximum acoustical equivalent altitude at the edge of the Environmental Study Area. The maximum acoustical equivalent altitude is similar to an average altitude at the edge of the Environmental Study Area except that it places greater weight in the averaging process on lower altitude aircraft since aircraft at lower altitudes will have a greater influence on the sound environment. The aircraft then maintained a shallow climb until it reached the maximum acoustical equivalent altitude at the edge of the Environmental Study Area.

Arriving aircraft began their descent at the edge of the Environmental Study Area and at the maximum acoustical equivalent altitude. The arriving aircraft maintained a steady descent until in the vicinity of the respective arrival airport and then maintained a level flight segment at 3,100 ft altitude AFE before starting the final descent. The distances of the level flight segments were determined by reviewing radar data and estimating where along an arrival profile (a plot of altitude versus ground track distance relative to the arrival runway) thirty percent of the aircraft maintained level flight. In general, the level flight segment for arrivals was approximately five to twenty-one nautical miles, but varied from airport to airport. This conservative method modeled slightly more aircraft at lower altitude than actually occurred.

These flight corridor methods were also applied to intra-study flights (e.g. flights departing one study airport and arriving at another). However, the maximum acoustical equivalent altitude was applied at the transition point between the modeled departure track and modeled arrival track instead of the study boundary.

Touch-and-go, or pattern traffic, cannot be directly modeled in NIRS. NIRS must model at least one point of a flight track above 3,000 ft AFE, and can only model level-flight segments above 3,000 ft AFE. Therefore a combination of departures and arrivals was used to model touch-and-go patterns. The departures were modeled to approximately 3,100 ft AFE and then maintained level flight until the aircraft reached the start of descent. At the start of descent the aircraft was modeled as an arrival back to the runway. If the pattern was not large enough for the climb and descent to 3,100 ft AFE, departures would continue to fly the pattern until the aircraft could reach 3,100 ft. Arrivals always start from 3,100 ft AFE, and descend at three-degrees to the appropriate runway end. If the pattern was too small for such a descent, the aircraft flew runway heading as if on approach, entered the pattern over the runway, flew the pattern once around and then landed. This technique occasionally modeled extra aircraft in a given location, and therefore provides an overestimate of the noise in certain locations. However, since the touch-and-go patterns are not affected by the proposed action, this conservative approach will not adversely affect the results.

All routes are checked for violations of general profile constraints, such as maximum climb and descent angles. If necessary, the route was flagged for further modification to remedy such anomalies.

3.3.9 Population Data

A detailed analysis of noise from aircraft operating between the surface and 12,000 feet AGL was performed at more than 300,000 locations throughout the 40,000+ square mile Environmental Study Area. The analysis evaluates noise conditions for specific locations on the ground based on population centroids (centers of census blocks) and grid points using the DNL metric. The locations consist of population centroids, noise sensitive locations such as schools, places of worship, and parks, and evenly spaced grids over the entire Environmental Study Area.

Census blocks are the smallest geographic unit for which the U. S. Census Bureau tabulates data. Census blocks are generally bounded by streets, legal boundaries, and other features. A portion of the Environmental Study Area is in Canada. Similar population information was gathered for the Canadian area. The number of people exposed to noise is estimated as the number residing in the census block. For this analysis, the census block counts represent the estimated population within the census block that could be exposed to the modeled DNL levels. The actual number of people impacted can be less than the total population represented by a single census block because noise levels will vary throughout the census block. A total number of 173,242 census blocks or centroid locations were analyzed.

The population levels for the future conditions were developed through a forecasting effort based on the 2000 census data. Population levels for each census block (centroid) were forecast for 2004, 2006 and 2011 so that a reasonable estimate of future noise impacts could be determined. In all cases, the location of each population centroid remained constant throughout the analysis. Only the numbers of people associated with each centroid varied by year based on the population forecast results. Detailed information regarding the population forecasting effort is available in **Appendix E**.

3.3.10 Supplemental Grid Points

A number of supplemental grid points were defined throughout the Environmental Study Area to account for noise-sensitive regions such as DOT Section 303/4f sites and to assist in quality control analysis of the NIRS output.

In addition to the population centroids, there were three types of grid areas analyzed in this study. First, low-density grids were used to cover the entire Environmental Study Area with 5,000 feet inter-point spacing between each grid point (27,023 points). These points allowed for full coverage of the Environmental Study Area, as well as coverage where population centroids were sparse. Second, a high density grid with 88,452 points at approximately 500 foot intervals was defined around CLE and DTW. These grids, in combination with the low-density grids, provided results used for quality control analysis of the NIRS output. When anomalous results were identified these grids assisted in tracking down the input error and facilitated corrections for the final NIRS runs. Finally, specific grid points were used to identify noise-sensitive locations, which included:

- Historic/Cultural Places
- National Parks
- State Forests
- State Parks
- Tribal Lands
- Wildlife Refuges

- Local Parks

In all cases, the location of each supplemental grid point remained constant throughout the analysis for both current and future conditions.

4. NOISE MODELING ANALYSIS

Community exposure to aircraft noise attributable to the current Baseline, future No Action, and the proposed airspace redesign alternative is assessed in this section. The analysis includes analysis of current (2004) aircraft noise exposure in the Environmental Study Area, as well as for the years 2006 and 2011. The evaluation primarily focuses on the change in aircraft noise associated with the alternative as compared to the future No Action conditions. The analysis presented in this section focuses on the noise conditions for specific locations at the population centroids (centers of census blocks) discussed in previous sections using the Day/Night Average Sound Level (DNL) for aircraft operations. The number of people exposed to various noise levels is estimated based on the number of persons residing in the census block corresponding to the centroid being evaluated. The noise exposure results are presented in terms of noise level and change criteria set forth by FAA policy as discussed in **Section 3.2.6** of this report.

Comparative noise impact results were tabulated for the future No Action and the alternative at the previously described population centroids. In addition, causes of change were investigated where zones of notable change, in defined by the criteria in **Section 3.2.6**, occurred due to the alternative. The process of change investigation involved the following steps:

Step 1: Zone Selection – The zones to be investigated were selected. This normally includes all zones shown in an impact map, corresponding to all population in the color-highlighted regions of the impact graph.

Step 2: Automated and Manual Analysis – The NIRS Change Analysis tool was applied to the selected zones. This tool automatically compares all pairs of corresponding traffic files between the Alterative scenario and respective No Action scenario to determine which file or files are the primary causes of the change of exposure associated with each zone. Since most traffic files are organized by airport, operation, and runway, the cause can be identified down to of a group of tracks and associated events. In addition, any zone that either enters or exists the DNL 65 dB threshold without exceeding the 1.5 dB threshold was investigated. A manual analysis is used because NIRS does not directly provide this information. Using the same algorithm as NIRS, the file or files that are the primary cause of the change of exposure associated with the zone is identified.

Step 3: Further Analysis – The traffic data that caused the change for each zone was further investigated. Given specific pairs of traffic files (one traffic file from the Alternative and the respective file from the No Action), maps of the tracks and the affected population centroids in each change zone are generated, and track location, aircraft type, day/night event counts, runway utilization, and/or dispersion that differ between scenarios were located.

The following sub-sections provide the results of the noise analysis for the current Baseline condition, the future No Action conditions, and the alternative investigated for 2006 and 2011. The sections begin with a brief summary of the major design elements of the scenario along with a general overview of the noise modeling input data changes incorporated in order to model the alternative. The results of the noise modeling are then presented for each year of interest in graphical and tabular form. The noise exposure changes from the No Action and alternative conditions are presented for each study year. Additionally, brief explanations of the causes associated with each change zone are presented.

4.1 Baseline Condition

The Baseline condition represents the aviation activity and airspace structure and procedures as they were in the year 2004. While not the primary focus of the noise considerations, this analysis provides a starting point or baseline for reviewing the noise modeling results for future conditions with and without the airspace redesign alternative.

4.1.1 Baseline Noise Model Input

The NIRS input for the Baseline 2004 condition was defined by a detailed review of the radar data. For a more detailed discussion of the process applied to create the baseline inputs, please refer to **Section 3.3** of this report.

4.1.2 Baseline Noise Impact Results

The results for Year 2004 Baseline condition are presented below for the population centroid locations in the Environmental Study Area. The FAA does not require comparisons to be made to Baseline condition. Its purpose is to provide a reader the opportunity to equate current personal experience to the noise metrics as well as the degree of exposure. Information provided refers to noise exposure levels only within the Environmental Study Area.

Exhibit 9 provides a graphical representation of the Year 2004 Baseline condition noise exposure levels for the entire Environmental Study Area. The color of each population centroid is categorically colored based on the following DNL ranges. Note that these colors are for presentation of the DNL values, not the change in DNL values as discussed **Section 3.2.6.**

- Less than 45 dB DNL – pink
- 45 dB to less than 50 dB DNL – dark blue
- 50 dB to less than 55 dB DNL – light blue
- 55 db to less than 60 dB DNL – green
- 60 dB to less than 65 dB DNL – yellow
- 65 dB to less than 70 dB DNL – orange

- Greater than or equal to 70 dB DNL – red

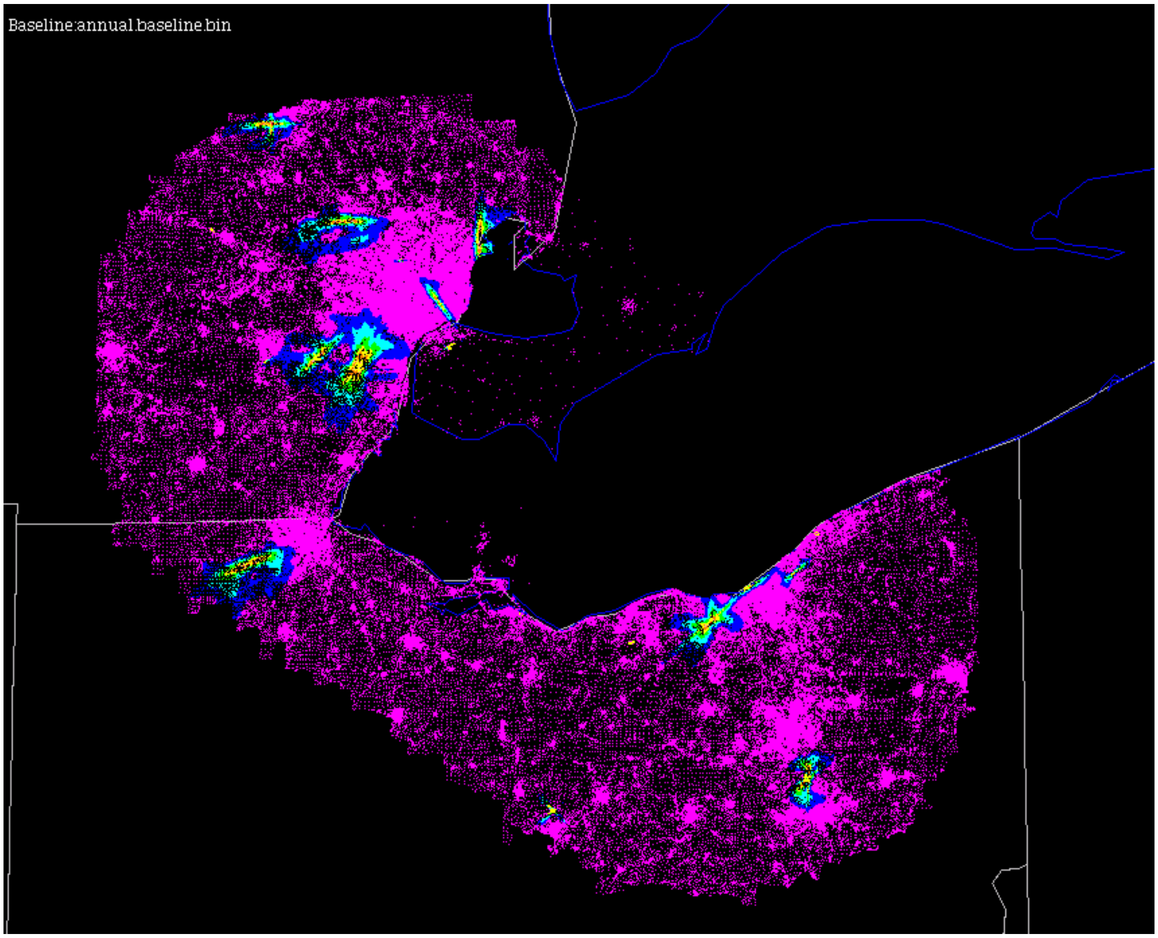


Exhibit 9: Baseline 2004 Aircraft Noise Exposure

In general, the majority of the Environmental Study Area is exposed to aircraft noise levels less than 45 dB DNL. As would be expected, the areas closer to the primary airports are exposed to the highest exposure levels.

As evidenced by **Table 9**, the majority (82.3%) of people residing within the Environmental Study Area are exposed to less than DNL 45 dB. Approximately 17,092 people (0.2% of the Environmental Study Area population) experience DNL 65 dB or greater within the Environmental Study Area under the Baseline condition.

Table 9: Baseline 2004 Estimated Population Exposed to Aircraft Noise

DNL Range (dB)	Population	Percentage of Total
Less than 45	8,372,839	82.3%
45 to less than 50	1,152,313	11.3%
50 to less than 55	437,643	4.3%
55 to less than 60	149,017	1.5%
60 to less than 65	46,211	0.5%
65 to less than 70	13,879	0.1%
70 to less than 75	2,757	<0.1%
Greater than or equal to 75	456	< 0.1%
Total	10,175,115	100.0%

Source: Metron Aviation Inc./HNTB, 2005

4.2 Future No Action Condition

The future No Action Alternative represents the expected future condition if no changes were implemented as a result of the airspace redesign project. This analysis provides the basis for comparison of the effects of the proposed redesign alternative. The estimated noise conditions were evaluated for the 2006 and 2011 timeframes.

4.2.1 Future No Action Noise Model Input

As discussed in **Section 3.3**, the NIRS modeling for the future No Action condition is largely based on the Baseline 2004 current condition modeling. Only two notable changes have been made to the current airspace structure to accommodate initiatives that are expected to be in place by 2006 regardless of this project. The SOIA for CLE runway 06R/24L was modeled for both 2006 and 2011, and the runway extension and shift for CLE runway 06R/24L that is expected to be completed by 2011 was accounted for in the analysis.

4.2.2 Future No Action Noise Impact Results

The NIRS noise analysis focuses on aircraft noise exposure in areas affected by DNL 45 dB and greater. The analysis evaluates the noise levels at each population centroid in the Environmental Study Area and computes the estimated population exposed to noise based on the criteria discussed in **Section 3.2.6** of this report. **Exhibit 10** presents the estimated DNL noise exposure pattern for the 2006 No Action condition throughout the Environmental Study Area.

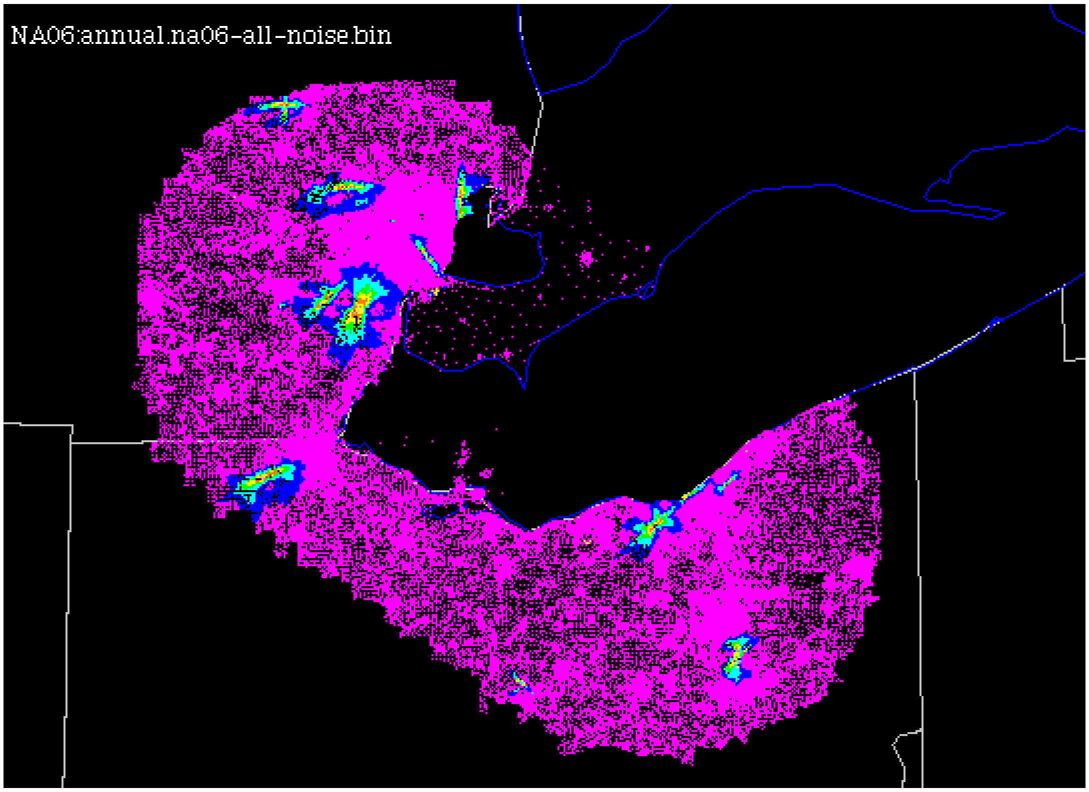


Exhibit 10: No Action 2006 Aircraft Noise Exposure

As the graphics indicate, the majority of the Environmental Study Area is exposed to aircraft noise below DNL 45 dB. The areas exposed to aircraft noise above DNL 45 dB are concentrated around the airports evaluated in the Environmental Study Area. As expected, the maps indicate that higher aircraft noise levels are produced near the study airports. The size of the noise pattern around each airport is generally a function of the operational levels, fleet mix, runway pattern and usage along with the predominant flight routes associated with each airport. The estimated 2006 aircraft noise exposure pattern is similar in size and shape to the Baseline 2004 pattern presented in **Exhibit 9**. In some areas the size of the 2006 noise pattern is reduced slightly from the 2004 condition, despite increases in operational levels. This effect is generally the result of fleet mix changes from older, noisier aircraft to new, quieter aircraft.

Exhibit 11 presents the estimated DNL aircraft noise patterns for the 2011 No Action condition. The noise patterns for 2011 are very similar in size and shape to those indicated for 2006. Slight increases of noise exposure can be seen around some study airports due to the modest increase in aircraft operations expected between 2006 and 2011. In other areas, some slight reduction in noise is expected due to further retirement of older aircraft in the fleet by 2011.

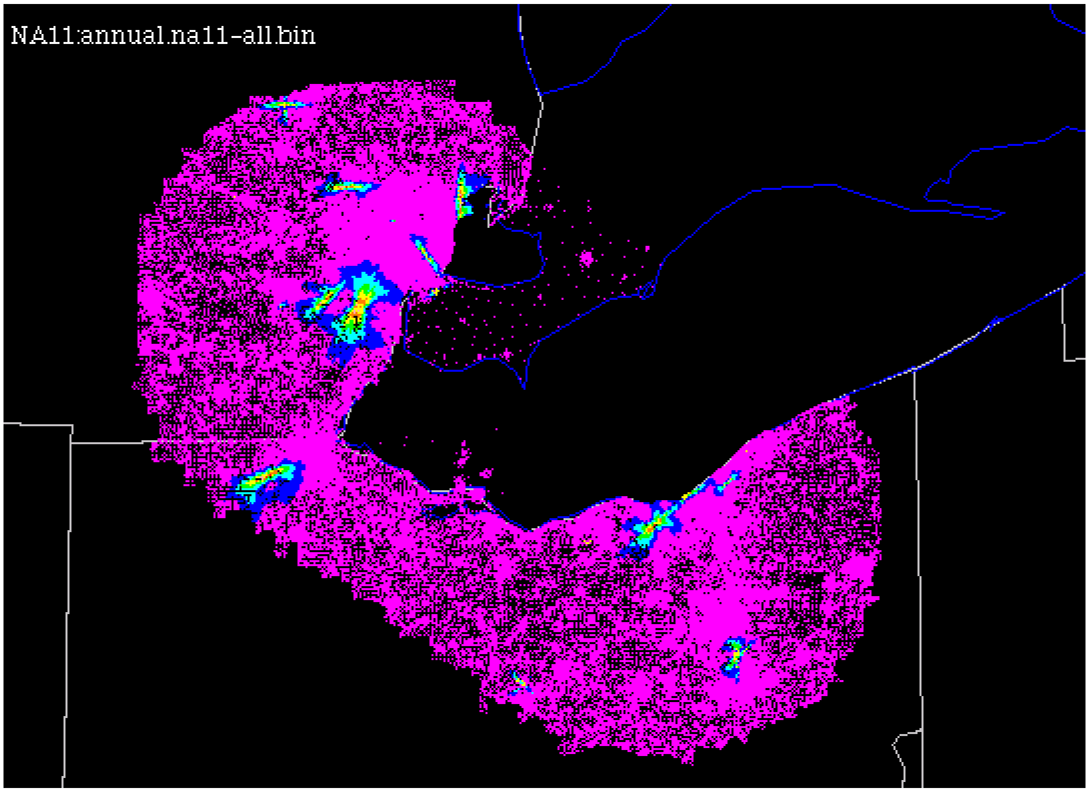


Exhibit 11: No Action 2011 Aircraft Noise Exposure

Table 10 presents the estimated population exposed to aircraft noise by DNL ranges for the future No Action condition.

Table 10: Future No Action Estimated Population Exposed to Aircraft Noise

DNL Range (dB)	2006		2011	
	Population	Percentage	Population	Percentage
Less than 45	8,391,672	82.1%	8,715,339	84.5%
45 to less than 60	1,766,615	17.3%	1,542,827	15.0%
60 to less than 65	45,734	0.6%	40,991	0.4%
Greater than 65	16,404	0.2%	13,501	0.1%
Total	10,220,425	100.00%	10,312,658	100.00%

Source: Metron Aviation Inc./HNTB Analysis, 2005

As shown in the table, over 82 percent of the Environmental Study Area population is estimated to be exposed to aircraft noise levels less than 45 DNL in 2006, and this increases to ~84 percent in 2011. Approximately 1.8 million people within the Environmental Study Area are expected to be exposed to noise levels of 45 DNL and greater due to aircraft noise in 2006 if no design changes are made. By the year 2011, it is estimated that the population exposed to noise levels above 45 DNL will decrease slightly by approximately 231,000 persons to just fewer than 1.6 million persons. In addition, the number of people exposed to noise of 65 DNL and greater is expected to decrease some 12.7 percent between 2006 and 2011 in the No Action scenario. The decreases are due to the expected retirement of older, noisier aircraft between 2006 and 2011.

4.3 Airspace Alternative

This alternative includes modifications to today's airspace and routing to improve operations. This alternative builds on the Future No Action Alternative. This section presents the results for the Airspace Alternative for the years 2006 and 2011.

4.3.1 Airspace Alternative Noise Model Input

The NIRS modeling for the future Alternative is based on the future No Action Alternative noise modeling input. Only the elements of the alternative design that are expected to be different from the No Action procedures or design were modified for this scenario.

As with the No Action analysis, noise modeling was developed for overflights and the expected IFR flight plan operations at the 15 airports identified as part of the study. The runways, local environmental variables, operations levels, and fleet mix used for the respective No Action scenario were also used in the respective future Alternative scenario. The day-night split proportions from the No Action scenario were also used for this alternative scenario. The following list provides a summary of the changes included in the alternative.

- New departure fixes (OBRLN and AMRST) to the west for CLE and its satellite airports

- Discontinue use of the MFD VORTAC as a departure fix for CLE and its satellites (this does not affect operation at MFD itself)

- Use of arrival fix (ABERZ) to the southwest for CLE and its satellites. WAKEM will no longer be used.

- CLE and its satellite north arrivals are shifted from GONNE to HIMEZ

- DTW and its satellites arrivals are shifted from CETUS and JUNKER to GEMNI and LLEEO, respectively. This change also impacts intra-study flights from CLE and its satellite airports.

- The east departure gates for DTW and its satellites are shifted. Traffic departing WINGS is shifted to the northwest to depart over MAARS, departures over TYCOB are shifted to the southwest to depart over ERRTH, and departures over HADAR in the No Action are shifted to the northeast to depart over MOONN.

- New arrival fix (WEEDA) to the south for DTW

- New arrival fix (PICES) to the northeast for DTW satellites including PTK, YIP, CYQG. These flights now arrive via LIBIL to PICES. For YIP, from PICES, aircraft fly to HADAR

- CAVVS will be used as a MASE departure fix for CYQG
- POLAR will be used as a MASE departure fix for FNT
- SCORR will be used as a MASE departure fix for YIP
- SCORR fix would be used for jet and prop departures in MASE.
- Tower en route traffic to MSP, MKE, GRR, and GRB that is currently routed to DUNKS would be moved to EARVN in MASE.

Each of these items required a group of flight track adjustments in order to model the alternative design. Only those No Action tracks that were affected by the design changes were modified. These movements generally only involved portions of the route within the Environmental Study Area, as dictated by the proposed alternative design. Flight track dispersion, the width of flight corridors, was only modified where route changes would likely have an effect on dispersion patterns.

Chapter 2 of the EA document provides a moderately detailed discussion of the design changes associated with this alternative.

4.3.2 Airspace Alternative Impact Results

The route and procedural changes associated with the alternative for 2006 are expected to result in an approximately 3 percent increase in the number of persons exposed to noise levels of DNL 45 dB or greater compared to the 2006 No Action. However, the 2006 alternative is expected to decrease the population exposed to DNL 65 dB and greater by 0.7 percent compared to the 2006 No Action. The 2011 alternative is expected to increase the population exposed to aircraft noise above 45 DNL by 2.8 percent compared to the No Action condition. However, the 2011 alternative would reduce the number of persons within the DNL 65 dB noise level by 0.9 percent compared to the 2011 No Action. **Table 11** presents a summary of the population exposed to noise levels for the Alternative as compared to the No Action scenario for both future years. The table highlights the areas where the alternative causes increases in population exposure for the specific DNL ranges as well as the decreases. Note that the increase and the decrease notation in Table 11 only indicates shifts between the categories presented within this table and not the categories presented in **Section 3.2.6**.

Table 11: Modeled Population Change - Airspace Alternative

		Increase		No Change		Decrease
		2006 No Action				
	DNL (dBA)	**<45**	**45 - <60 dB**	**60 - <65 dB**	**>=65 dB**	**Alternative**
2006 Alternative	**<45**	8,293,392	42,605	0	0	8,335,997
	45 - <60 dB	98,280	1,721,974	694	0	1,820,948
	60 - <65 dB	0	2,036	44,929	227	47,192
	>=65 dB	0	0	111	16,177	16,288
	No Action	8,391,672	1,766,615	45,734	16,404	10,220,425
		2011 No Action				
	DNL (dBA)	**<45**	**45 - <60 dB**	**60 - <65 dB**	**>=65 dB**	**Alternative**
2011 Alternative	**<45 dB**	8,618,568	51,573	0	0	8,670,141
	45 - <60 dB	96,771	1,489,195	666	0	1,586,632
	60 - <65 dB	0	2,059	40,274	174	42,507
	>=65 dB	0	0	51	13,327	13,378
	No Action	8,715,339	1,542,827	40,991	13,501	10,312,658

Source: NIRS Analysis, Metron Aviation Inc./HNTB 2005

In order to determine the relevance of the changes in noise exposure associated with the Alternative, an analysis of the changes relative to the FAA noise impact criteria was done. **Exhibits 12** through **Exhibit 16** presents maps of the Alternative noise changes, defined by the criteria in **Section 3.2.6** at the population centroids for both 2006 and 2011 respectively. The centroids are color coded to identify the criterion that they meet and whether the noise increased or decreased. The zones labeled in the graphics are discussed in more detail below. Only centroids meeting one of the eight categories defined in **Section 3.2.6** are shown in these exhibits for clarity. Centroids meeting one of the eight categories are assigned zone designation. These zones are discussed individually later in this section.

Exhibit 12: CLE Noise Changes No Action vs. Alternative 2006
(Population centroid color coding per Section 3.2.6 and based only on noise values and not on landuse)

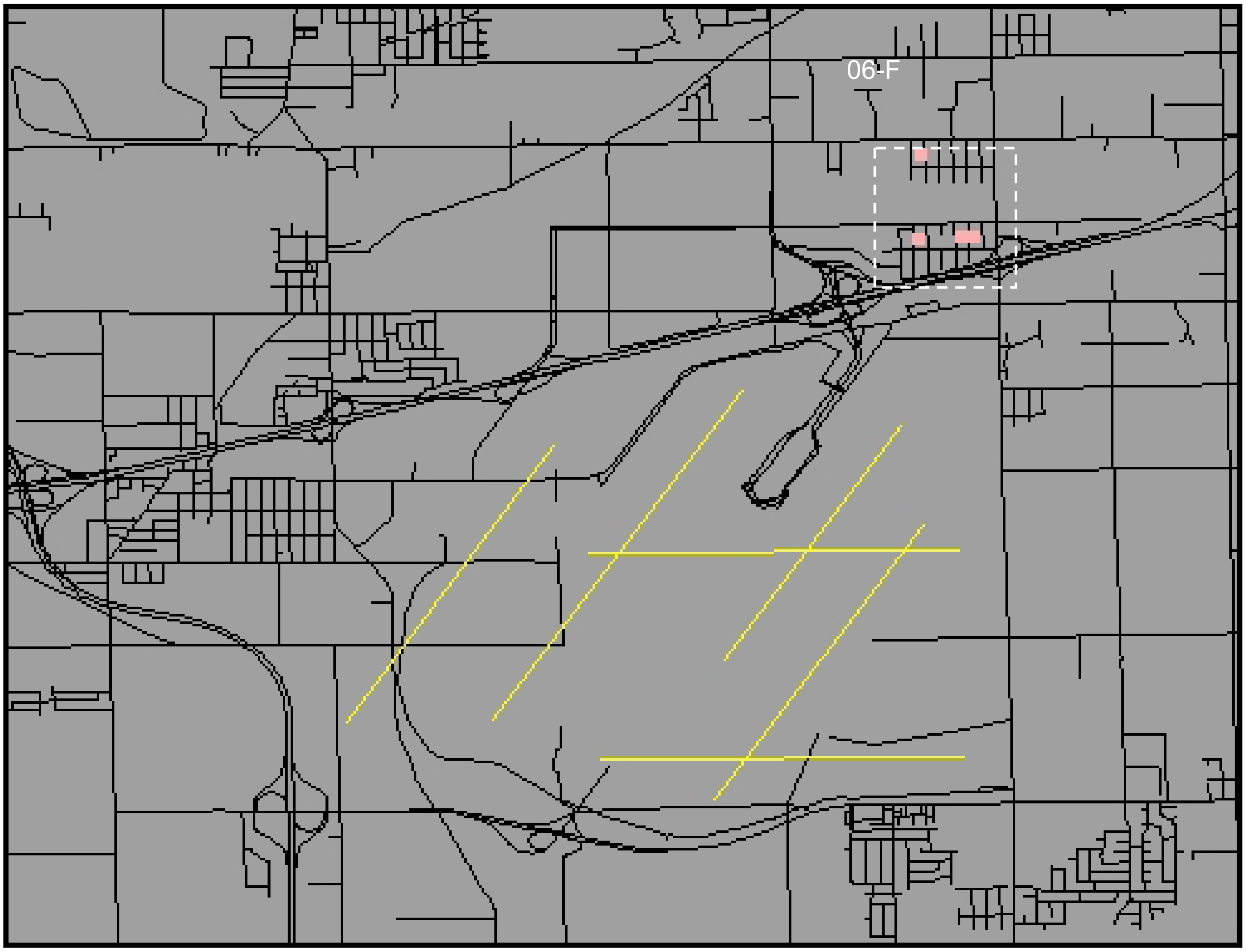


Exhibit 13: DTW Noise Changes No Action vs. Alternative 2006
(Population centroid color coding per Section 3.2.6 and based only on noise values and not on landuse)

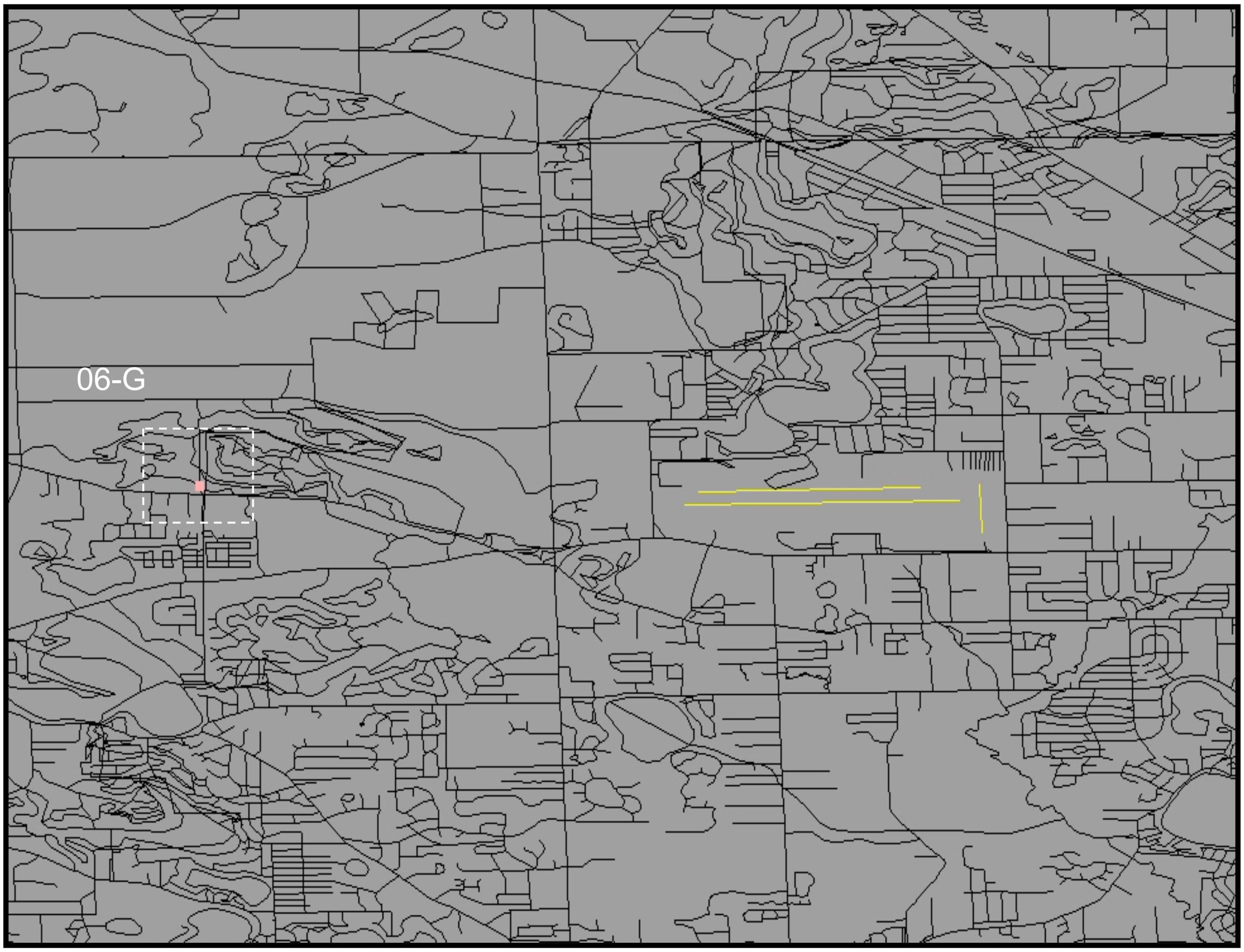


Exhibit 14: PTK Noise Changes No Action vs. Alternative 2006
(Population centroid color coding per Section 3.2.6 and based only on noise values and not on landuse)

Exhibit 15: CLE Noise Changes No Action vs. Alternative 2011
(Population centroid color coding per Section 3.2.6 and based only on noise values and not on landuse)

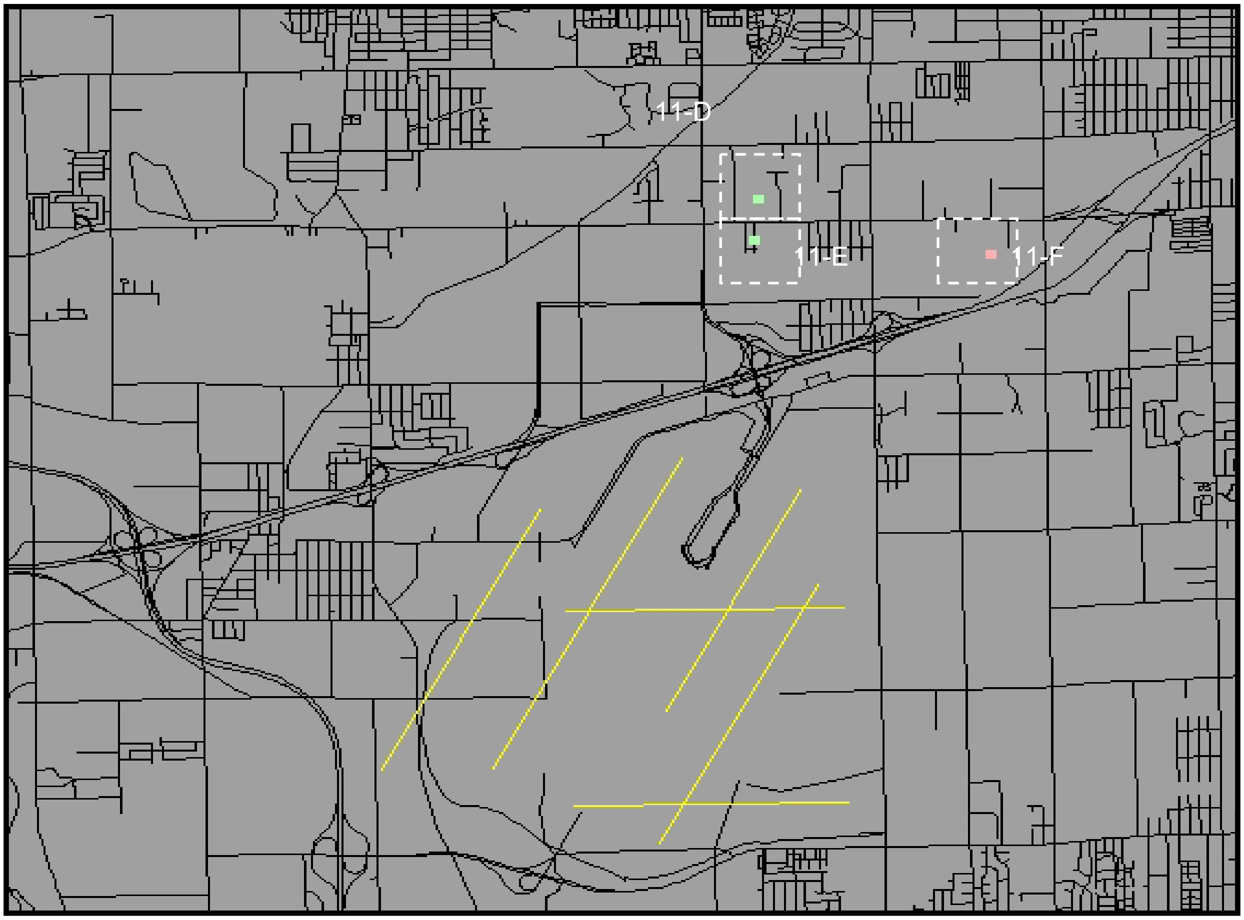


Exhibit 16: DTW Noise Changes No Action vs. Alternative 2011
(Population centroid color coding per Section 3.2.6 and based only on noise values and not on landuse)

As the exhibits indicate, the changes associated with this alternative are generally clustered around DTW and CLE with a small amount of change evidenced near PTK for 2006. The color coding of the centroids reveal that there are both increases and decreases in noise in both future years resulting from the alternative design. **Table 12** presents a summary for the estimated change in population exposed to aircraft noise levels that meet the criteria defined in **Section 3.2.6** resulting from the proposed Alternative design. The cells in the table are color coded similar to the scheme used on the exhibits so that specific numbers of persons can be related to the maps of the noise change.

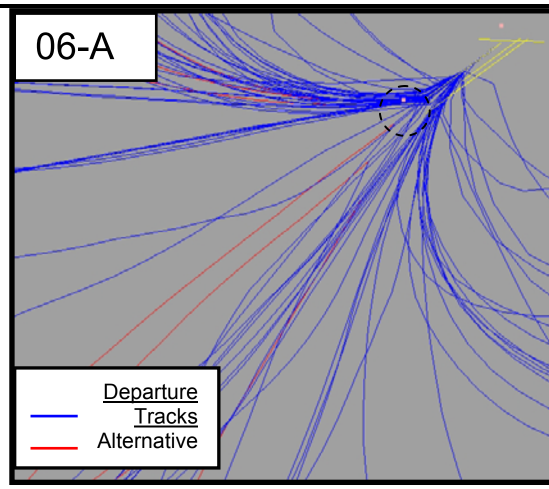
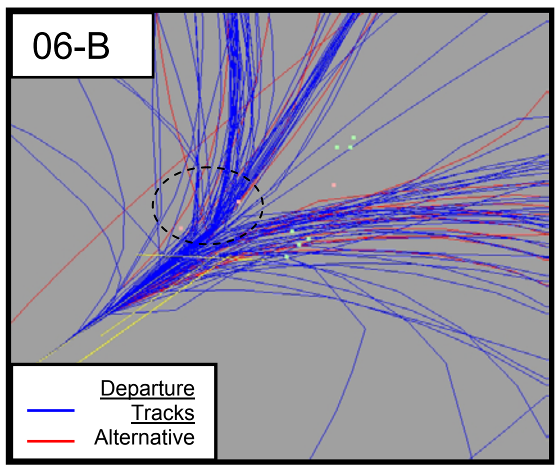
Table 12: Airspace Alternative - Population Impact Change Analysis Summary

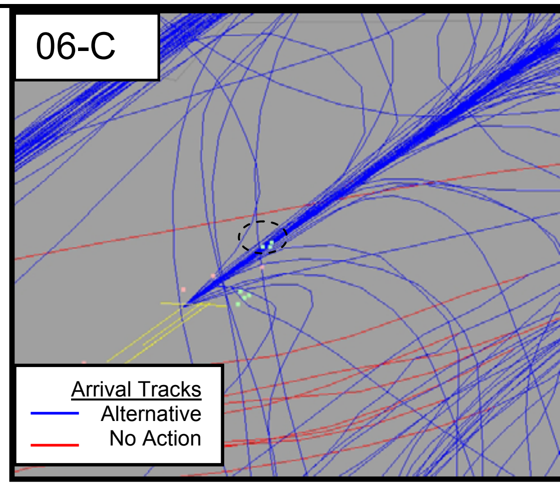
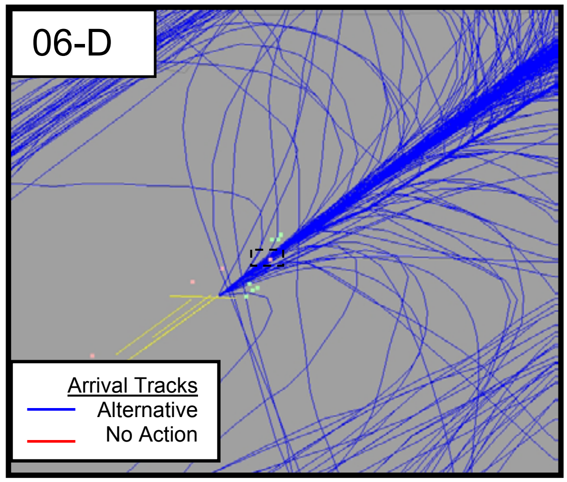
	DNL Noise Exposure With Alternative			
	65 dB or higher		60 to 65 dB	45 to 60 dB
Minimum Change in DNL With Alternative	<1.5 dB	1.5 dB	3.0 dB	5.0 dB
Level of Impact	Newly Impacted	Significant	Slight to Moderate	Slight to Moderate
Noise Increases				
2006	111	-	-	-
2011	51	0	-	-
Noise Decreases				
2006	227	-	-	-
2011	174	-	-	-

Source: NIRS Analysis, Metron Aviation Inc./HNTB, 2005

Based on the NIRS analysis, 111 persons would be "Newly Impacted" by noise in 2006 resulting from the alternative design. This number would decrease in 2011 to 51 persons. The alternative design for 2006 and 2011 also provides "Newly Relieved" benefits. In 2006 this level of relief would be experienced by some 227 persons and would decrease in 2011 to 174 persons. Note: There were two population centroids in 2011 that received a change in noise level associated with significant impact however both points had zero population values and therefore these points are not considered noise sensitive for this analysis and do not meet FAA's criteria for significant impact. Additional discussion of the individual zones that do meet the criteria discussed in **Section 3.2.6** is presented below.

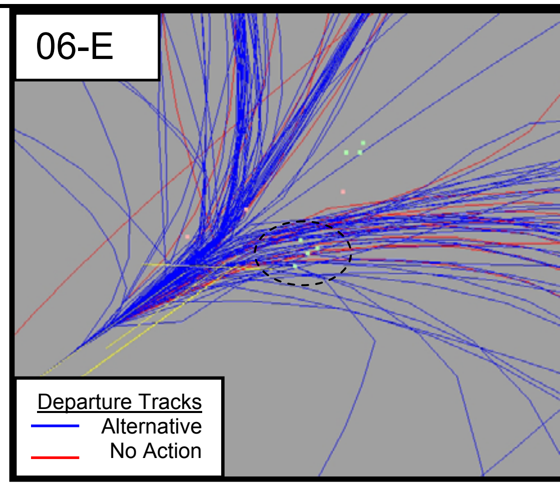
In order to provide a better understanding of the noise impacts resulting from this change analysis, the areas of change within the Environmental Study Area were divided into small zones of change for discussion purposes. These zones are generally associated with a specific airport and are identified with a unique name or identifier. The following paragraphs discuss change in noise exposure associated with this alternative in terms of these change zones. Exhibits are provided with enlarged views of the various change zones along with the name of each zone. The change in noise is discussed for each zone along with the cause for the noise changes in the zone. Where applicable, inset diagrams are included to illustrate the flight route changes that were primarily responsible for the changes in the zone of interest.

No Action vs. Alternative 2006 Change Zone Description	Graphic
06-A: This increase in noise is caused by an increase of departures from CLE's Runway 24R. The MASE table assigns new fixes to some departure city pairs. The use of the inboard and outboard runways at CLE is determined primarily by the fix that serves a particular origin/destination. In the No Action scenario there were no night time departures in this area. In the alternative, approximately 5 night time operations will fly over this area. The increase in traffic resulted in a DNL 0.6 dB increase, (2006 Alternative DNL minus 2006 No Action DNL), causing the centroid to be greater than DNL 65 dB in the alternative.	
06-B: These increases in noise are caused by an expected increase in CLE's Runway 06L day departures. For the alternative, there is an increase of 39% of annual average day operations departing runway 06L compared to the No Action. The increase in operations is due to the alterations to origin/destination-fix pairing associated with the MASE table. The increase in traffic caused these centroids to shift from below DNL 65 dB in the 2006 No Action to above the DNL 65 dB threshold with the Alternative, however the increase is less than 1.5 dB compared to the 2006 No Action.	

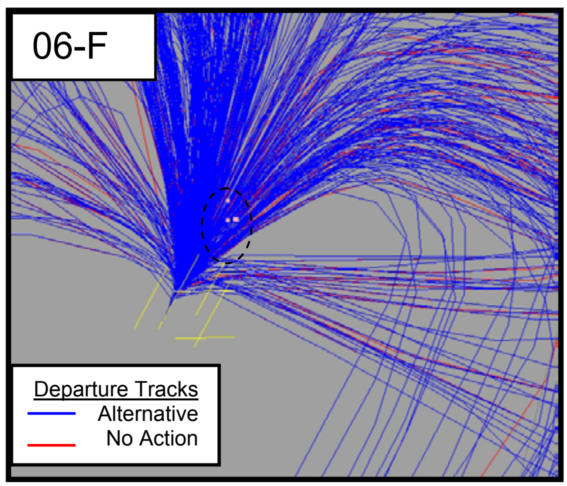
No Action vs. Alternative 2006 Change Zone Description	**Graphic**
06-C: These reductions in noise are caused by the decrease of CLE's Runway 24R arrivals. The decrease of arrivals is due to the new origin/destination-fix pairings in the MASE table. The decrease is largely due to night arrival operations on runway 24R decreasing by almost half. The decrease in traffic resulted in a DNL decrease, causing the centroids to become less than DNL 65 dB in the Alternative.	
06-D: The increase in noise is caused by the increase of certain aircraft types on CLE's Runway 24L for night time arrival operations. The change in fleet is due to the proposed origin/destination-fix pairings in the MASE table. In the No Action, there are fewer medium jets arriving on runway 24L at night and more propeller traffic compared to the alternative. The increase in the medium jet aircraft resulted in a DNL increase, causing the centroid to become greater than DNL 65 dB, however the increase is less than 1.5 dB compared to the 2006 No Action.	

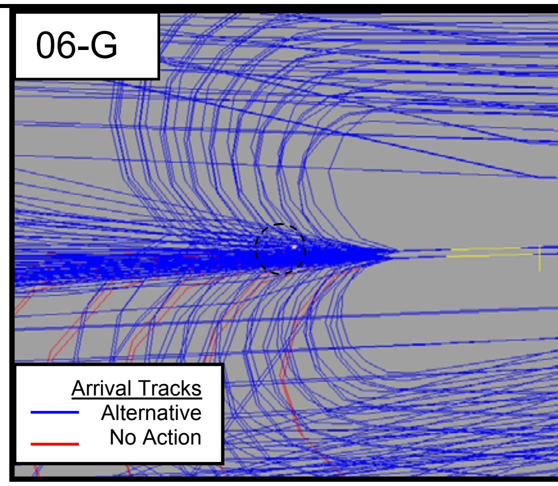
No Action vs. Alternative 2006 Change Zone Description	Graphic

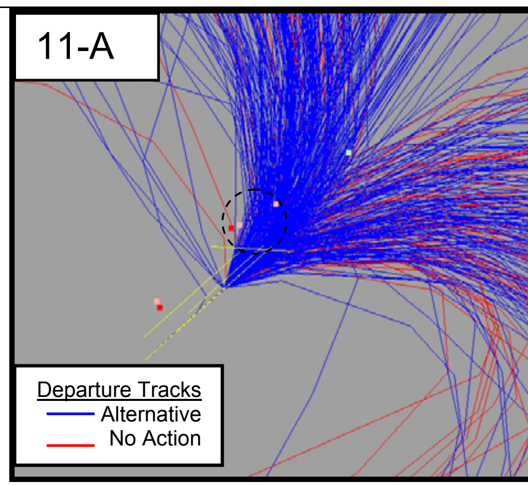
06-E: These decreases in noise are caused by the decrease of operations departing and turning right off CLE's Runway 06R. The reduction is caused by the removal of the MFD VORTAC as a departure navaid for CLE and the introduction of OBRLN and AMRST as new departure fixes for CLE. Traffic that used to turn right off runway 06R towards the MFD VORTAC will turn left off the runway toward OBRLN and AMRST in the alternative. The termination of the MFD VORTAC as a departure fix created a one third decrease in departures turning right off the runway. The decrease is expected to cause a DNL decrease, causing the centroids to become less than DNL 65 dB for the Alternative compared to greater than DNL 65 dB for the No Action.

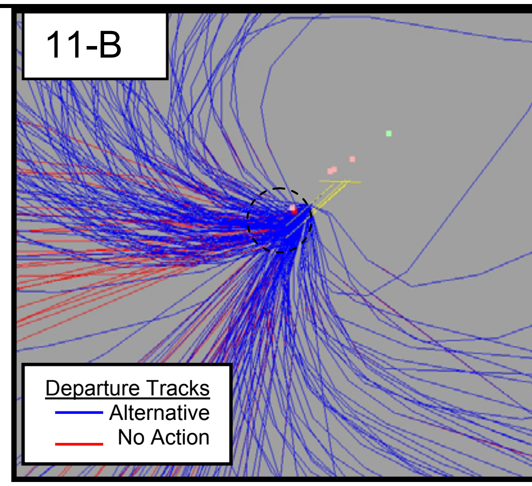
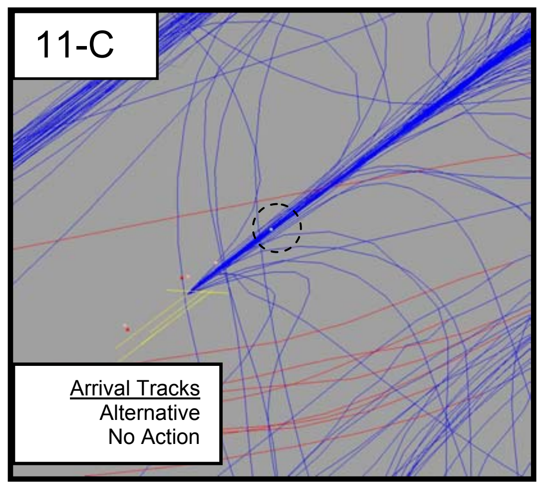
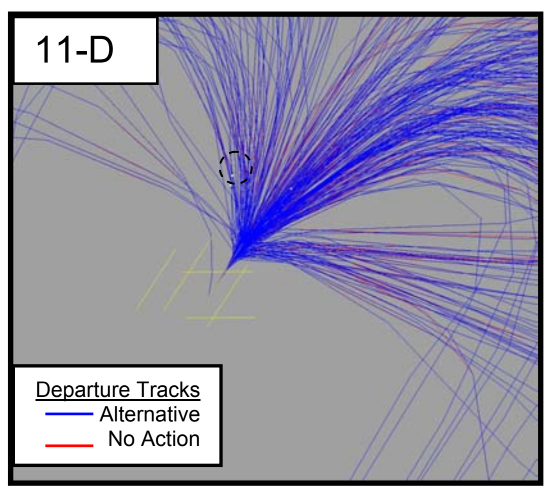


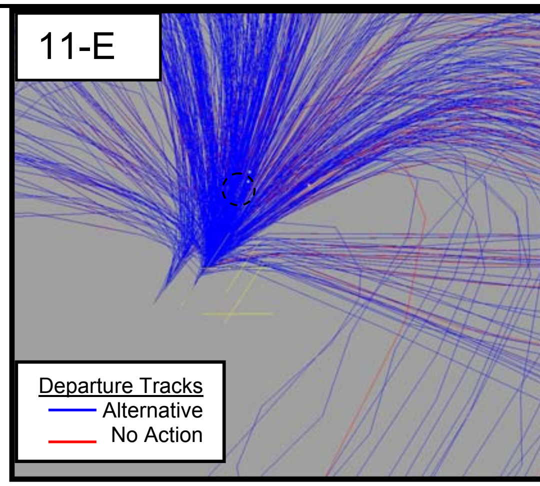
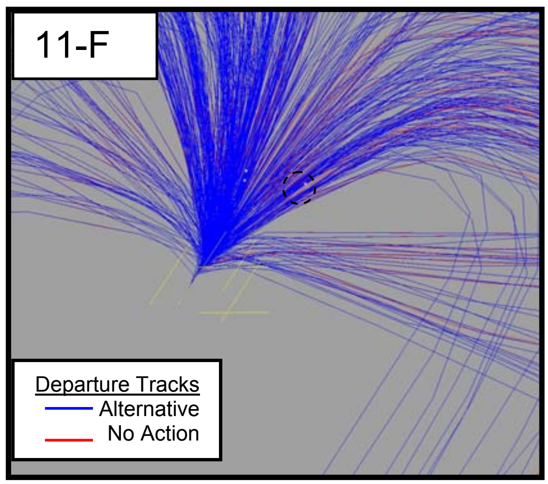
06-F: These increases in noise are caused by an increase of DTW Runway 04R departures. The increase is due the proposed MASE table reassignment of certain departures to the new MOONN and SCORR jet departure fixes. The increase resulted in a DNL increase, causing the centroids to become greater than DNL 65 dB, however the increase is less than 1.5 dB compared to the 2006 No Action.



No Action vs. Alternative 2006 Change Zone Description	Graphic
06-G: These increases in noise are caused by an increase of arrival traffic to PTK. The DNL increased from 64.9 dB to 65.0 dB. This is a very small increase in noise and should not be detectable to humans. This increase is caused by a shift in operations due to traffic that arrived over HADAR in No Action was moved over LLEEO in the alternative.	

No Action vs. Alternative 2011 Change Zone Description	Graphic
11-A: These increases in noise are caused by the increase of operations departing and turning left off Runway 06R. The increase is caused by the removal of the MFD VORTAC as a departure fix for CLE and the introduction of OBRLN and AMRST as new departure fixes for CLE. Traffic that used to turn right off runway 06R towards MFD will turn left off the runway towards OBRLN and AMRST in the alternative. These changes resulted in three centroids increasing to DNL 65 dB or above. Two centroids increase by less than 1.5 dB. The third centroid did increase by at least 1.5 dB, however there is no population associated with this point and therefore is not considered noise sensitive and is not considered a significant impact.	

No Action vs. Alternative 2006 Change Zone Description	Graphic
11-B: These increases in noise are caused by the increase of operations departing CLE's Runway 24R. These increases in departures are due to the new destination-fix assignments defined in the MASE table and the movement of departures from the MFD VORTAC to OBRLN/AMRST. These changes resulted in two centroids increasing to DNL 65 dB or above. One centroid increases by less than 1.5 dB. The other centroid did increase by at least 1.5 dB, however there is no population associated with this point and therefore is not considered noise sensitive and is not considered a significant impact.	
11-C: This reduction in noise is caused by the decrease of CLE's Runway 24R arrivals. The decrease of arrivals is due to the new origin/destination-fix pairings in the MASE table. The decrease in traffic resulted in a DNL decrease, causing the centroid to become less than DNL 65 dB.	
11-D: This reduction in noise is caused by the decrease of DTW's Runway 03L night departures to the east. The decrease is due to the new origin/destination-fix pairings in the MASE table. The decrease in traffic resulted in a DNL decrease, causing the centroid to become less than DNL 65 dB.	

No Action vs. Alternative 2006 Change Zone Description	Graphic
11-E: This reduction in noise is caused by the decrease of DTW's Runway 04L and Runway 04R night departures to the east. The decrease is due to the new origin/destination-fix pairings in the MASE reroute table. The decrease in traffic resulted in a DNL decrease, causing the centroids to become less than DNL 65 dB.	
11-F: This increase in noise is caused by the increase of DTW's Runway 04R departures. The increase is due to the proposed origin/destination-city pairing in the MASE table. Additional traffic would be assigned to SCORR, increasing the amount of traffic turning right off Runway 04R. Hence, the increase in traffic resulted in a DNL increase, causing the centroid to become greater than DNL 65 dB, however the increase is less than 1.5 dB compared to the 2011 no Action.	

4.8 Aircraft Noise Impacts– Summary

The noise exposure analysis indicates that the alternative will generate minor changes over the no action condition. Though there is an increase in the number of people that can be exposed to DNL 45 dB or greater, there is also a net decrease in the number of people that will be exposed to DNL 65 dB or greater.

Attachment A

AIRCRAFT OPERATIONS AND RUNWAY USE TABLES

CLE Runway Usage

CLE runway use assumptions with the No Action Alternative and Proposed Action were developed through coordination with CLE and ZOB ATC personnel.

As shown in **Table 1**, there have been changes in runway use at CLE from the assumptions in the CLE 2000 Runway FEIS versus 2004 actual operations (as derived from radar data). This change is due to the unforeseen shift in the destinations served by airlines operating at CLE with regional jets as well as overall changes to airline activity since September 11, 2001. These changes could not have been anticipated during development of the CLE 2000 Runway FEIS.

Table 1: CLE Runway Use - 2000 FEIS versus 2004 Actual

Operation Type	2000 Runway FEIS		Actual 2004 Operations	
	Runway 06R/24L	Runway 06L/24R	Runway 06R/24L	Runway 06L/24R
Arrivals	30.0%	70.0%	50.0%	50.0%
Departures	70.0%	30.0%	67.0%	33.0%

Source: CLE 2000 FEIS, 2004 radar data.

ATC primarily uses city pairs (i.e., the arrival and destination airport for a specific flight) and aircraft type to assign an aircraft to a specific runway, given favorable wind conditions. A particular arrival or departure city pair typically translates to a routing via a specific arrival or departure fix that is geographically proximate to the active arrival or departure runway being used.

Based on conversations with local CLE ATCT and TRACON personnel with respect to current operations and runway use, analysis of 2004 radar data, and analysis of 2006 forecast operational data for this EA, a runway use analysis was conducted to determine the appropriate runway use percentages for noise modeling. Note that Runway 06R/24L is sometimes referred to as the east or inboard runway in that it is on the east side of the airport, or inboard with respect to location relative to the CLE landside terminal area. Runway 06R/24L is also considered the primary departure runway, with a planned 55% of departure operations. Conversely, Runway 06L/24R is sometimes referred to as the west or outboard runway, where this runway is considered the primary arrival runway, with a planned 55% of arrival operations.

CLE Primary Runway(s) Use Analysis: Assumptions and Inputs

1. The north and south runway configuration use split is 40% and 60%, respectively, for both the No Action Alternative and the Proposed Action.

2. Arrival runway use for North flow is: 06L – 55%, 06R – 45%

3. Arrival runway use for South flow is 24R – 55%, 24L – 45%

4. Each arrival fix has its own primary arrival runway

a. CXR – 24L/06R
b. KEATN – 24L/06R
c. ABERZ – 24R/06L
d. HIMEZ – 24R/06L
e. GONNE – 24R/06L
f. WAKEM – 24R/06L
g. ACO (low altitude arrivals) – 24L/06R
h. MFD (low altitude arrivals) – 24R/06L

5. Arrivals will be unable to arrive on their primary arrival runway at least 10% of the time.

6. Departure runway use is determined by fix and would be
   a. North flow: 06L – 45%, 06R – 55%
   b. South flow: 24R – 45%, 24L – 55%

7. Each departure fix has it's own primary departure runway
   a. ACO – 24L/06R (No Action 24R/06L)
   b. AMRST – 24R/06L
   c. APE – 24L/06R (No Action 24R/06L)
   d. FAILS – 24R/06L (No Action 24R/06L)
   e. GEMNI – 24L/06R (New CETUS 24R/06L)
   f. OBRLN – 24R/06L
   g. SKY – 24R/06L
   h. LLEEO – 24R/06L
   i. MFD – 24L/06R
   j. VARYS – 24R/06L (DTW only)

8. Departures will be unable to depart on their primary departure runway 10% of the time.

9. All current runway heading and noise abatement procedures identified the CLE Standard Operating Procedure (SOP) Sections 706 and 707 will continue to be used (Reference high-level noise abatement procedures on **page 2-5**).

CLE Primary Runway(s) Use Analysis: Methodology

1. Based on the forecast 2006 schedule approximately 57% of the operations arrive from the east fixes which means an increased percentage would need to shift to the west runway (outboard-06L/24R) to match the 55/45 split in Assumptions 2 and 3 previously.

2. Assuming 10% of arrivals from the west will need to arrival on the secondary runway, we began by assigning 90% of the west arrivals to the outboard runway and 10% to the inboard.

3. Given the constraint that the runway use percentage for arrivals is 55% for the outboard and 45% for the inboard, approximately 26% of arrivals from the east need to arrive on the outboard runway instead of the inboard runway.

4. For departures, using the assumption that departures will be unable to depart their primary runway 10% of the time, 90% of departures to the west were assigned to the outboard runway, while 10% were assigned to the inboard runway. Also, 90% of departures to the east were assigned to the inboard runway with the other 10% being assigned to the outboard runway.

CLE Primary Runway(s) Use Analysis; Results

1. Using the methodology above, 55% of arrivals arrive on the outboard runway (06L/24R), while 45% arrive on the inboard (06R/24L).

2. Contrary to Assumption 6, if we assign runway by fix only for departures, we would have 55% departing on the outboard runway (06L/24R) and 45% departing on the inboard runway (06R/24L).

Based upon this runway use fix balancing analysis, the following high-level runway use parameters identified in **Table 2 and 3** were validated by CLE ATCT/TRACON and the Cleveland Center (ZOB) personnel. The ATC Specialists from these facilities indicated that the new mix of arrival and departure traffic forecast for CLE in 2006 would be best handled with this runway use approach. These general parameters were used in developing the runway assignments for noise modeling, where the percentages changed slightly when considering the average annual day (AAD) requirements with some flights allocated to the east-west CLE Runway 10/28, located on the north side of the airport.

Table 2 identifies the typical shifts from a primary to secondary runway usage that would be reflective of ATC fix and runway use balancing during periods of high demand at CLE for the 2006 No Action Alternative.

Table 3 identifies the change inherent in the Proposed Action that shifts from using Mansfield (MFD) as a major departure fix in the 2006 No Action Alternative to using the OBRLN and ARMST fixes in the Proposed Action. Note that a list of relevant NAVAIDS and fixes have been identified in **Appendix C**, with location descriptions relative to the primary study area airports.

<table>
<tr><th colspan="5">Table 2: CLE 2006 No Action Runway Use Assessment</th></tr>
<tr><th rowspan="3">Operation Type</th><th colspan="2" rowspan="2">Strictly Fix Based</th><th colspan="2">Typical Runway Use Fix Balancing Approach for Periods of High Demand CLE/ZOB Intended Use</th></tr>
<tr><th>Prime Departure Runway</th><th>Prime Arrival Runway</th></tr>
<tr><th>Runway 06R/24L</th><th>Runway 06L/24R</th><th>Runway 06R/24L</th><th>Runway 06L/24R</th></tr>
<tr><td rowspan="2">Arrivals</td><td rowspan="2">56.7%</td><td rowspan="2">43.3%</td><td colspan="2">90% 6L/24R - 10% 06R/24L Shift</td></tr>
<tr><td>55.3%</td><td>44.7%</td></tr>
<tr><td rowspan="2">Departures</td><td rowspan="2">52.0%</td><td rowspan="2">48.0%</td><td colspan="2">80% 6R/24L - 20% 06L/24R Shift</td></tr>
<tr><td>56.4%%</td><td>43.6%</td></tr>
</table>

Table 3: CLE 2006 MASE Runway Use Assessment - Strictly Fix Based Runway Use vs. Typical Runway Use Fix Balancing Approach for Periods of High Demand				
Operation Type	**Strictly Fix Based**		**CLE/ZOB Intended Use**	
			Prime Departure Runway	**Prime Arrival Runway**
	Runway 06R/24L	**Runway 06L/24R**	**Runway 06R/24L**	**Runway 06L/24R**
Arrivals	56.7%	43.3%	**90% 6L/24R - 10% 06R/24L Shift**	
Percentage			55.3%	44.7%
Departures	52.0%	48.0%	**80% 6R/24L - 20% 06L/24R Shift**	
Percentage			56.4%	43.6%

The high-level runway usage analysis in **Tables 2 and 3** was compiled using just the primary northeast and southwest runways. When assessed on an average annual day (AAD) basis, a small number of operations occur on the east-west Runway 10/28, located on the north side of CLE. For noise modeling purposes, a representative AAD volume of aircraft were assigned to runway 10/28, as this runway assignment is used for approximately 1% of operations. **Table 4** identifies the actual runway usage percentages used for noise modeling at CLE. Note that minor rounding errors exist with respect to the noise modeling numbers, as fractions of operations are assigned to various runways to account for an AAD based allocation in the noise analysis. **Appendix I** contains detailed runway usage noise modeling data for both CLE and DTW in support of the No Action Alternative and Proposed Action.

Table 4: CLE 2006 No Action and MASE Runway Use - Noise Modeling AAD Allocations (w/ Runway 10/28)						
CLE	**No Action 2006 (MFD)**			**MASE 2006 (OBRLN-ARMST)**		
Runway	**Arrival**	**Departure**	**Total**	**Arrival**	**Departure**	**Total**
06L	18.3%	16.7%	17.5%	17.4%	21.3%	19.4%
06R	21.5%	23.0%	22.2%	22.3%	18.3%	20.5%
10	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
24L	31.9%	33.9%	32.9%	33.0%	27.0%	30.2%
24R	26.7%	25.4%	26.1%	25.9%	32.0%	28.9%
28	1.1%	1.1%	1.1%	1.1%	0.8%	1.0%
Total	367	366	733	367	366	733
Runway	**Arrival**	**Departure**	**Total**	**Arrival**	**Departure**	**Total**
06L/24R	45.2%	42.0%	43.6%	43.3%	53.2%	48.3%
06R/24L	53.5%	56.7%	55.1%	55.4%	45.6%	50.5%
10/28	1.3%	1.3%	1.3%	1.3%	1.2%	1.2%
Total	367	366	733	367	366	733

DTW Runway Usage

DTW runway use assumptions for both the No Action Airspace Design Alternative and the MASE Airspace Design Alternative have been developed, after thorough coordination with Detroit ATCT/TRACON (DTW/D21) and Cleveland Center (ZOB) ATC personnel. The initial runway use analysis was based on assessment of current radar data, along with assessment of forecast operations and validation by the operational personnel on how DTW/D21 would operate in the future. Overall there is no big change in the overall runway usage between the No Action Alternative and the Proposed Action.

Runway usage at DTW is relatively straight forward. The airport operates in primarily either a northwest flow (Runways 04L, 04R, 03L and 03R) for approximately 43% of arrivals and departures, or a southwest flow (Runways 22R, 22L, 21R and 21L) for approximately 56% of arrivals and departures. Approximately 1% of the operations on an annual average day basis use the east-west runways 09R/27L or 09L/27R, with the majority of these operations in a westerly flow (i.e., landing and departing the 27s).

Table 5 identifies the actual runway usage percentages used for noise modeling at DTW for both the No Action and MASE alternatives. Note that rounding errors exist with respect to the noise modeling numbers, as fractions of operations are assigned to various runways to account for an AAD based allocation in the noise analysis.

Table 5: DTW 2006 Noise Modeling AADD No Action and MASE Runway Use

Runway	Arrivals		Departures	
	Count & Percentage		Count & Percentage	
	No Action	Proposed Action	No Action	Proposed Action
03R	8.7%	7.8%	2.0%	1.9%
21L	10.1%	10.5%	3.5%	3.7%
Total 03R/21L	18.8%	18.2%	5.5%	5.6%
03L	1.2%	1.1%	6.1%	7.0%
21R	1.3%	1.3%	7.5%	7.1%
Total 03L/21R	2.5%	2.4%	13.5%	14.2%
04R	1.9%	1.8%	12.6%	13.4%
22L	2.4%	2.5%	17.0%	15.4%
Total 04R/22L	4.3%	4.3%	29.6%	28.7%
04L	10.4%	10.2%	0.3%	0.3%
22R	13.1%	14.1%	0.8%	0.8%
Total 04L/22R	23.5%	24.3%	1.0%	1.1%
09L	0.0%	0.0%	0.1%	0.1%
27R	0.1%	0.1%	0.2%	0.2%
Total 09L/27R	0.1%	0.1%	0.3%	0.3%
09R	0.0%	0.0%	0.0%	0.0%
27L	0.7%	0.5%	0.1%	0.1%
Total 09R/27L	0.7%	0.5%	0.1%	0.1%

Baseline

7D2 Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.6%	0.0%	35.3%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.4%	0.0%	64.7%	0.0%

7D2 Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.4%	0.0%	45.6%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.6%	0.0%	54.4%	0.0%

ARB Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.6%	0.0%	36.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.4%	0.0%	63.2%	0.0%

ARB Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.6%	0.0%	39.9%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.4%	0.0%	60.1%	0.0%

BKL Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	06L	0.0%	0.0%	0.0%	0.0%	46.7%	47.0%	44.3%	41.2%	37.0%	48.1%
	06R	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%	4.1%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	6.1%	10.7%	9.3%	12.0%	1.1%	11.6%
	24R	0.0%	0.0%	0.0%	0.0%	44.9%	42.3%	46.4%	46.9%	57.8%	40.4%

BKL Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	06L	0.0%	0.0%	0.0%	0.0%	23.9%	22.2%	21.2%	25.1%	18.7%	0.0%
	06R	0.0%	0.0%	0.0%	0.0%	15.0%	10.8%	8.8%	9.3%	19.3%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	24R	0.0%	0.0%	0.0%	0.0%	61.1%	67.0%	69.9%	65.6%	62.0%	0.0%

CAK Baseline Departure Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	1	100.0%	0.0%	0.0%	0.0%	33.5%	29.6%	22.2%	22.4%	22.6%	38.0%
	5	0.0%	0.0%	0.0%	0.0%	6.5%	2.2%	7.8%	5.2%	12.6%	19.7%
	19	0.0%	0.0%	0.0%	0.0%	4.9%	5.9%	8.1%	0.7%	14.6%	0.4%
	23	0.0%	0.0%	0.0%	0.0%	55.0%	62.4%	61.9%	71.7%	50.3%	42.0%

CAK Baseline Arrival Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	1	100.0%	0.0%	0.0%	0.0%	31.1%	33.6%	33.1%	27.5%	30.4%	26.1%
	5	0.0%	0.0%	0.0%	0.0%	12.9%	21.1%	11.1%	7.7%	14.5%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	16.2%	11.3%	14.1%	6.1%	17.0%	13.1%
	23	0.0%	0.0%	0.0%	0.0%	39.8%	34.0%	41.7%	58.7%	38.1%	60.9%

CGF Baseline Departure Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	6	0.0%	0.0%	0.0%	0.0%	43.5%	43.2%	45.9%	0.0%	40.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	56.5%	56.8%	54.1%	0.0%	59.2%	0.0%

CGF Baseline Arrival Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	6	0.0%	0.0%	0.0%	0.0%	36.2%	0.0%	38.0%	0.0%	46.1%	50.0%
	24	0.0%	0.0%	0.0%	0.0%	63.8%	0.0%	62.0%	100.0%	53.9%	50.0%

CLE Baseline Departure Runway Use Percentages											
A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	06L	4.0%	10.9%	20.2%	4.0%	17.3%	16.0%	31.8%	4.0%	16.2%	9.6%
	06R	35.1%	28.3%	19.2%	35.1%	22.5%	23.9%	7.8%	35.1%	22.6%	29.6%
	10	0.1%	0.2%	0.3%	0.1%	0.2%	0.2%	0.4%	0.1%	0.2%	0.2%
	24L	53.0%	42.7%	29.0%	53.0%	33.5%	35.9%	11.8%	53.0%	31.4%	44.8%
	24R	6.0%	16.4%	30.4%	6.0%	25.4%	22.9%	47.8%	6.0%	28.5%	14.3%
	28	1.8%	1.4%	1.0%	1.8%	1.1%	1.1%	0.4%	1.8%	1.0%	1.5%

CLE Baseline
Arrival Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	06L	35.8%	41.3%	16.1%	35.8%	17.5%	30.1%	19.6%	35.8%	13.1%	23.8%
	06R	3.9%	4.5%	23.1%	3.9%	22.3%	9.8%	24.8%	3.9%	26.3%	16.5%
	10	0.5%	0.6%	0.3%	0.5%	0.3%	0.4%	0.0%	0.5%	0.2%	0.3%
	24L	5.9%	6.8%	35.0%	5.9%	32.9%	13.9%	34.7%	5.9%	39.8%	22.0%
	24R	53.7%	46.6%	24.3%	53.7%	26.0%	45.3%	20.1%	53.7%	19.3%	36.6%
	28	0.2%	0.2%	1.2%	0.2%	1.1%	0.4%	0.8%	0.2%	1.3%	0.7%

CYQG Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	7	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%	45.5%	65.6%	60.8%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	15.2%	0.0%	9.8%	3.3%	12.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	39.8%	0.0%	14.5%	8.2%	15.9%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	12.0%	0.0%	30.1%	22.9%	10.4%	0.0%

CYQG Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	7	0.0%	0.0%	0.0%	0.0%	30.4%	20.0%	18.8%	7.1%	31.0%	40.0%
	12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	47.4%	70.0%	63.1%	85.7%	60.3%	60.0%
	30	0.0%	0.0%	0.0%	0.0%	22.2%	10.0%	18.1%	7.1%	8.6%	0.0%

DET Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.4%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	31.9%	21.9%	40.5%	30.6%	26.3%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	5.6%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	65.8%	78.1%	59.5%	69.4%	66.8%	0.0%

DET Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	39.8%	51.2%	37.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	6.7%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	61.6%	0.0%	60.2%	48.8%	53.8%	0.0%

DTW Baseline
Departure Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	03L	1.2%	6.4%	18.2%	4.2%	12.9%	11.6%	20.5%	0.0%	10.9%	1.6%
	03R	0.2%	23.2%	14.2%	18.7%	3.7%	0.7%	7.9%	0.0%	5.7%	10.1%
	04L	1.2%	7.8%	0.0%	8.3%	0.4%	1.0%	0.0%	0.0%	0.7%	4.5%
	04R	38.9%	16.7%	10.3%	0.0%	25.3%	29.0%	8.7%	0.0%	24.1%	7.2%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%	0.0%	0.7%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
	21L	1.1%	18.1%	26.0%	16.7%	6.6%	6.9%	15.2%	0.0%	8.0%	1.1%
	21R	2.2%	3.6%	23.4%	10.4%	15.9%	11.8%	30.3%	0.0%	13.8%	2.5%
	22L	49.9%	23.3%	7.9%	33.3%	33.7%	36.6%	9.5%	0.0%	30.2%	67.3%
	22R	5.3%	0.8%	0.0%	8.3%	1.4%	2.0%	0.0%	0.0%	1.8%	2.1%
	27L	0.0%	0.0%	0.0%	0.0%	0.1%	0.4%	0.0%	0.0%	0.6%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.5%	3.6%

DTW Baseline
Arrival Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	03L	0.0%	0.0%	6.4%	1.7%	2.5%	1.5%	3.2%	0.0%	2.4%	4.6%
	03R	10.7%	22.3%	28.3%	19.4%	16.9%	9.3%	16.3%	0.0%	14.9%	38.5%
	04L	25.2%	39.2%	4.6%	46.1%	20.5%	27.2%	17.8%	0.0%	21.8%	33.8%
	04R	6.6%	6.8%	1.9%	0.0%	3.1%	15.4%	0.8%	0.0%	3.4%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	21L	14.0%	12.0%	41.4%	12.2%	21.8%	8.9%	27.5%	0.0%	19.2%	15.4%
	21R	0.0%	0.0%	8.5%	10.6%	2.6%	3.5%	3.8%	0.0%	2.1%	0.0%
	22L	10.3%	2.3%	2.9%	3.3%	4.1%	16.1%	2.3%	0.0%	4.1%	1.5%
	22R	33.2%	17.5%	3.6%	6.7%	26.8%	18.1%	26.4%	0.0%	30.4%	3.1%
	27L	0.1%	0.0%	2.3%	0.0%	1.4%	0.1%	1.6%	0.0%	1.4%	1.5%
	27R	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.3%	0.0%	0.3%	1.5%

FNT Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	9	0.0%	0.0%	0.0%	0.0%	28.0%	18.8%	31.5%	25.6%	31.4%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	18.8%	19.1%	15.7%	41.5%	18.5%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	47.4%	59.2%	45.9%	31.7%	46.3%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	5.8%	3.0%	6.9%	1.2%	3.8%	0.0%

FNT Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	9	0.0%	0.0%	0.0%	0.0%	9.8%	18.9%	18.4%	34.5%	17.4%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	12.5%	3.3%	7.5%	6.9%	3.3%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	65.4%	50.1%	63.0%	51.7%	55.2%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	12.3%	27.6%	11.1%	6.9%	24.1%	0.0%

MFD Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	11.3%	20.0%	7.0%	0.0%	14.7%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	25.3%	20.0%	34.9%	0.0%	32.4%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	63.4%	60.0%	58.1%	0.0%	52.9%	0.0%

MFD Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	5	0.0%	0.0%	0.0%	0.0%	19.2%	0.0%	31.0%	0.0%	17.7%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	19.1%	0.0%	33.0%	0.0%	23.1%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	17.2%	0.0%	19.2%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	45.0%	0.0%	18.7%	0.0%	40.0%	0.0%

MTC Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	1	61.6%	0.0%	49.9%	33.4%	0.0%	0.0%	37.6%	0.0%	0.0%	0.0%
	19	38.4%	0.0%	50.1%	66.6%	0.0%	0.0%	62.4%	0.0%	0.0%	0.0%

MTC Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	1	50.6%	0.0%	47.4%	33.4%	0.0%	0.0%	43.3%	0.0%	0.0%	0.0%
	19	49.4%	0.0%	52.6%	66.6%	0.0%	0.0%	56.7%	0.0%	0.0%	0.0%

PTK Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	09L	0.0%	0.0%	0.0%	0.0%	4.5%	3.1%	8.1%	0.8%	14.0%	5.2%
	09R	0.0%	0.0%	0.0%	0.0%	39.4%	34.5%	37.6%	32.3%	26.7%	23.4%
	27L	0.0%	0.0%	0.0%	0.0%	49.4%	53.1%	47.0%	64.6%	38.2%	62.4%
	27R	0.0%	0.0%	0.0%	0.0%	6.7%	9.3%	7.2%	2.3%	21.1%	9.1%

PTK Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	09L	0.0%	0.0%	0.0%	0.0%	5.6%	6.5%	8.6%	4.7%	11.7%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	37.3%	40.8%	34.6%	48.5%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	47.8%	40.2%	44.4%	39.1%	37.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	9.4%	12.6%	12.4%	7.7%	19.5%	0.0%

TOL Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	7	52.0%	0.0%	0.0%	0.0%	30.6%	34.6%	24.0%	23.5%	40.4%	100.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	48.0%	0.0%	0.0%	0.0%	69.4%	65.4%	76.0%	76.5%	59.6%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

TOL Baseline
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	7	42.9%	0.0%	0.0%	0.0%	33.2%	53.0%	43.4%	42.5%	13.7%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.5%
	25	57.1%	0.0%	0.0%	0.0%	66.8%	47.0%	56.6%	57.5%	84.5%	95.5%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

YIP Baseline
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	05L	0.0%	0.0%	0.0%	0.0%	20.0%	23.3%	16.3%	23.6%	17.9%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	26.7%	40.6%	28.5%	31.8%	17.7%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	26.4%	19.4%	28.6%	27.1%	27.5%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	20.6%	16.7%	18.0%	15.4%	27.2%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	5.6%	0.0%	5.8%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	3.0%	2.1%	4.0%	0.0%

YIP Baseline
Arrival Runway Use Percentages

A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2004	05L	0.0%	0.0%	0.0%	0.0%	13.1%	15.5%	10.7%	5.4%	24.7%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	37.7%	40.8%	32.8%	42.8%	21.0%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	38.6%	32.1%	43.8%	43.7%	22.6%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	10.7%	11.6%	12.7%	8.1%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Metron Aviation Inc./HMMH, 2005

Future No Action

7D2 Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.6%	0.0%	35.3%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.4%	0.0%	64.7%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.6%	0.0%	35.3%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.4%	0.0%	100.0%	0.0%

7D2 Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.4%	0.0%	45.6%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.6%	0.0%	54.4%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.4%	0.0%	45.6%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.6%	0.0%	54.4%	0.0%

ARB Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.6%	0.0%	36.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.4%	0.0%	63.2%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.6%	0.0%	36.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.4%	0.0%	100.0%	0.0%

ARB Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.6%	0.0%	39.9%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.4%	0.0%	60.1%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.6%	0.0%	39.9%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.4%	0.0%	60.1%	0.0%

BKL Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	0.0%	0.0%	0.0%	0.0%	46.7%	47.0%	44.4%	41.2%	37.0%	48.1%
	06R	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%	4.1%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	6.1%	10.7%	9.5%	12.0%	1.1%	11.6%
	24R	0.0%	0.0%	0.0%	0.0%	44.9%	42.3%	46.1%	46.9%	57.8%	40.4%
2011	06L	0.0%	0.0%	0.0%	0.0%	47.3%	47.0%	44.4%	41.2%	35.4%	48.1%
	06R	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	4.8%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	6.2%	10.7%	9.5%	12.0%	1.1%	11.6%
	24R	0.0%	0.0%	0.0%	0.0%	44.6%	42.3%	46.1%	46.9%	58.7%	40.4%

BKL Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	0.0%	0.0%	0.0%	0.0%	23.9%	22.2%	20.7%	25.1%	18.7%	0.0%
	06R	0.0%	0.0%	0.0%	0.0%	15.0%	10.8%	9.1%	9.3%	19.3%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	24R	0.0%	0.0%	0.0%	0.0%	61.1%	67.0%	70.2%	65.6%	62.0%	100.0%
2011	06L	0.0%	0.0%	0.0%	0.0%	24.3%	22.2%	20.7%	25.1%	18.5%	0.0%
	06R	0.0%	0.0%	0.0%	0.0%	14.5%	10.8%	9.1%	9.3%	20.7%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	24R	0.0%	0.0%	0.0%	0.0%	61.2%	67.0%	70.2%	65.6%	60.8%	100.0%

CAK Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	100.0%	0.0%	0.0%	0.0%	33.6%	29.6%	22.3%	22.4%	22.6%	38.0%
	5	0.0%	0.0%	0.0%	0.0%	6.6%	2.2%	7.8%	5.3%	12.6%	19.7%
	19	0.0%	0.0%	0.0%	0.0%	4.9%	5.9%	7.9%	0.5%	14.6%	0.4%
	23	0.0%	0.0%	0.0%	0.0%	55.0%	62.4%	61.9%	71.8%	50.3%	42.0%
2011	1	100.0%	0.0%	0.0%	0.0%	33.6%	29.6%	22.4%	22.5%	22.6%	38.0%
	5	0.0%	0.0%	0.0%	0.0%	6.6%	2.2%	7.8%	5.3%	12.6%	19.7%
	19	0.0%	0.0%	0.0%	0.0%	4.9%	5.9%	7.9%	0.4%	14.6%	0.4%
	23	0.0%	0.0%	0.0%	0.0%	54.8%	62.4%	61.9%	71.8%	50.3%	42.0%

CAK Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	100.0%	0.0%	0.0%	0.0%	31.0%	33.6%	33.1%	27.5%	30.5%	26.1%
	5	0.0%	0.0%	0.0%	0.0%	12.9%	21.1%	11.1%	7.6%	14.1%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	16.2%	11.3%	14.1%	6.1%	17.2%	13.1%
	23	0.0%	0.0%	0.0%	0.0%	39.8%	34.0%	41.7%	58.7%	38.1%	60.9%
2011	1	100.0%	0.0%	0.0%	0.0%	31.0%	33.6%	33.1%	27.5%	30.6%	26.1%
	5	0.0%	0.0%	0.0%	0.0%	13.0%	21.1%	11.1%	7.6%	13.9%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	16.4%	11.3%	14.1%	6.1%	17.3%	13.1%
	23	0.0%	0.0%	0.0%	0.0%	39.7%	34.0%	41.7%	58.7%	38.2%	60.9%

CGF Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	43.5%	43.2%	45.9%	0.0%	40.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	56.5%	56.8%	54.1%	0.0%	59.2%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	43.5%	43.2%	45.9%	0.0%	40.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	56.5%	56.8%	54.1%	0.0%	59.2%	0.0%

CGF Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	38.0%	0.0%	46.1%	50.0%
	24	0.0%	0.0%	0.0%	0.0%	63.7%	0.0%	62.0%	100.0%	53.9%	50.0%
2011	6	0.0%	0.0%	0.0%	0.0%	37.3%	14.3%	38.0%	0.0%	46.1%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	62.7%	85.7%	62.0%	100.0%	53.9%	0.0%

CLE Future No Action
Departure Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	4.0%	10.9%	20.2%	4.0%	16.9%	15.1%	31.8%	4.0%	17.0%	10.2%
	06R	35.1%	28.3%	19.2%	35.1%	22.8%	24.8%	7.8%	35.1%	19.8%	29.0%
	10	0.0%	0.1%	0.3%	0.1%	0.2%	0.2%	0.4%	0.0%	0.2%	0.1%
	24L	53.1%	42.8%	29.0%	53.1%	34.0%	37.3%	11.8%	53.1%	24.8%	43.9%
	24R	6.0%	16.4%	30.4%	6.0%	24.9%	21.6%	47.8%	6.0%	37.5%	15.3%
	28	1.8%	1.4%	1.0%	1.8%	1.1%	1.1%	0.4%	1.8%	0.8%	1.5%
2011	06L	35.1%	28.3%	18.3%	35.1%	23.2%	26.7%	7.8%	35.1%	18.2%	29.0%
	06R	4.0%	10.9%	21.1%	4.0%	16.8%	12.9%	31.8%	4.0%	14.2%	10.2%
	10	0.1%	0.2%	0.3%	0.1%	0.2%	0.2%	0.4%	0.1%	0.2%	0.2%
	24L	53.0%	42.7%	27.7%	53.0%	33.8%	40.5%	11.8%	53.0%	27.6%	43.9%
	24R	6.0%	16.4%	31.7%	6.0%	24.8%	18.4%	47.8%	6.0%	38.9%	15.3%
	28	1.8%	1.4%	0.9%	1.8%	1.1%	1.2%	0.4%	1.8%	0.9%	1.5%

CLE Future No Action
Arrival Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	35.8%	41.3%	16.1%	35.8%	17.1%	30.6%	23.4%	35.8%	12.8%	26.7%
	06R	3.9%	4.5%	23.1%	3.9%	22.7%	9.3%	21.7%	3.9%	26.4%	12.8%
	10	0.5%	0.6%	0.3%	0.5%	0.3%	0.4%	0.0%	0.5%	0.2%	0.4%
	24L	5.9%	6.8%	35.0%	5.9%	33.5%	13.2%	31.3%	5.9%	39.9%	19.4%
	24R	53.7%	46.6%	24.3%	53.7%	25.3%	46.0%	23.1%	53.7%	19.3%	40.1%
	28	0.2%	0.2%	1.2%	0.2%	1.1%	0.4%	0.5%	0.2%	1.4%	0.7%
2011	06L	35.8%	35.8%	17.7%	35.8%	17.4%	28.3%	20.0%	35.8%	13.9%	26.7%
	06R	3.9%	3.9%	21.7%	3.9%	22.6%	11.6%	22.1%	3.9%	25.3%	12.8%
	10	0.5%	0.4%	0.3%	0.5%	0.3%	0.4%	0.0%	0.5%	0.2%	0.4%
	24L	5.9%	5.9%	32.8%	5.9%	33.1%	16.7%	38.5%	5.9%	38.3%	19.4%
	24R	53.7%	53.8%	26.5%	53.7%	25.5%	42.5%	18.6%	53.7%	20.9%	40.1%
	28	0.2%	0.2%	1.1%	0.2%	1.1%	0.5%	0.7%	0.2%	1.3%	0.7%

CYQG Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%	45.5%	65.6%	60.8%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	15.2%	0.0%	9.8%	3.3%	12.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	39.8%	0.0%	14.5%	8.2%	15.9%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	12.0%	0.0%	30.1%	22.9%	10.4%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%	45.5%	65.6%	60.8%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	15.2%	0.0%	9.8%	3.3%	12.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	39.8%	0.0%	14.5%	8.2%	15.9%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	12.0%	0.0%	30.1%	22.9%	10.4%	0.0%

CYQG Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	30.4%	20.0%	18.8%	7.1%	31.0%	40.0%
	12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	47.4%	70.0%	63.1%	85.7%	60.3%	60.0%
	30	0.0%	0.0%	0.0%	0.0%	22.2%	10.0%	18.1%	7.1%	8.6%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	30.4%	20.0%	18.8%	7.1%	31.0%	40.0%
	12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	47.4%	70.0%	63.1%	85.7%	60.3%	60.0%
	30	0.0%	0.0%	0.0%	0.0%	22.2%	10.0%	18.1%	7.1%	8.6%	0.0%

DET Future No Action Departure Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.4%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	31.9%	21.9%	40.5%	30.6%	26.3%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	5.6%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	65.8%	78.1%	59.5%	69.4%	66.8%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.4%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	31.9%	21.9%	40.5%	30.6%	26.3%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	5.6%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	65.8%	78.1%	59.5%	69.4%	66.8%	0.0%

DET Future No Action Arrival Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	39.8%	51.2%	37.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	6.7%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	61.6%	0.0%	60.2%	48.8%	53.8%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	39.8%	51.2%	37.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	6.7%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	61.6%	0.0%	60.2%	48.8%	53.8%	0.0%

DTW Future No Action
Departure Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	03L	1.5%	4.8%	18.7%	4.2%	12.5%	13.0%	20.5%	0.0%	11.7%	3.9%
	03R	0.4%	17.7%	13.5%	18.7%	3.6%	0.9%	7.9%	0.0%	7.0%	0.4%
	04L	1.1%	6.7%	0.1%	8.3%	0.4%	1.0%	0.0%	0.0%	0.7%	0.6%
	04R	39.3%	22.7%	11.9%	0.0%	25.7%	27.6%	8.7%	0.0%	22.9%	8.9%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%	0.0%	0.9%	1.8%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	2.2%
	21L	1.1%	14.8%	25.5%	16.7%	6.4%	8.3%	15.2%	0.0%	8.0%	17.0%
	21R	2.3%	2.7%	23.0%	10.4%	15.5%	12.5%	30.3%	0.0%	14.7%	2.0%
	22L	49.3%	28.6%	7.1%	33.3%	34.3%	34.4%	9.5%	0.0%	28.8%	59.0%
	22R	5.0%	1.8%	0.1%	8.3%	1.4%	1.8%	0.0%	0.0%	1.4%	1.3%
	27L	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.0%	0.0%	0.5%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	2.8%
2011	03L	1.2%	5.6%	21.4%	3.1%	12.2%	12.9%	20.5%	0.0%	11.4%	6.9%
	03R	0.4%	23.3%	13.4%	17.6%	3.5%	0.9%	7.9%	0.0%	9.5%	9.3%
	04L	1.1%	8.7%	0.1%	6.3%	0.4%	1.0%	0.0%	0.0%	0.6%	0.0%
	04R	40.4%	15.0%	10.6%	7.1%	26.1%	28.5%	8.7%	0.0%	21.9%	11.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%	0.0%	0.8%	4.4%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.9%
	21L	1.0%	20.3%	27.2%	14.3%	6.2%	8.1%	15.2%	0.0%	8.2%	30.0%
	21R	2.2%	4.0%	24.7%	7.8%	15.1%	12.6%	30.3%	0.0%	14.3%	8.7%
	22L	48.5%	22.5%	2.3%	37.5%	34.8%	34.1%	9.5%	0.0%	28.1%	18.1%
	22R	5.2%	0.6%	0.1%	6.3%	1.5%	1.8%	0.0%	0.0%	1.5%	7.3%
	27L	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.5%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	3.5%

DTW Future No Action
Arrival Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	03L	0.0%	0.0%	6.5%	1.7%	2.4%	1.6%	8.2%	0.0%	2.5%	4.6%
	03R	13.0%	33.7%	31.2%	19.4%	17.8%	8.9%	34.8%	0.0%	18.0%	38.5%
	04L	25.7%	40.4%	5.6%	46.1%	20.5%	25.2%	3.8%	0.0%	19.5%	33.8%
	04R	6.7%	5.8%	1.9%	0.0%	3.1%	16.3%	0.6%	0.0%	3.5%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	21L	14.4%	8.7%	38.0%	12.2%	20.9%	10.3%	31.6%	0.0%	20.7%	15.4%
	21R	0.0%	0.0%	8.3%	10.6%	2.6%	3.9%	12.7%	0.0%	1.7%	0.0%
	22L	10.1%	0.0%	2.6%	3.3%	4.1%	16.5%	3.8%	0.0%	4.1%	1.5%
	22R	29.4%	11.5%	4.1%	6.7%	26.9%	17.0%	2.5%	0.0%	28.2%	3.1%
	27L	0.6%	0.0%	2.0%	0.0%	1.5%	0.0%	0.6%	0.0%	1.6%	1.5%
	27R	0.0%	0.0%	0.0%	0.0%	0.3%	0.1%	1.3%	0.0%	0.3%	1.5%
2011	03L	0.0%	0.0%	5.9%	1.7%	2.3%	1.3%	3.8%	0.0%	2.6%	4.6%
	03R	10.5%	18.0%	27.3%	19.4%	16.4%	8.5%	18.4%	0.0%	18.6%	38.5%
	04L	25.4%	41.1%	6.1%	46.1%	21.1%	27.3%	15.1%	0.0%	18.0%	33.8%
	04R	6.5%	6.3%	2.0%	0.0%	3.1%	15.3%	0.4%	0.0%	3.6%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	21L	13.6%	9.6%	41.1%	12.2%	21.1%	8.6%	30.3%	0.0%	22.4%	15.4%
	21R	0.0%	0.0%	8.3%	10.6%	2.5%	3.4%	4.7%	0.0%	1.8%	0.0%
	22L	10.2%	4.1%	2.8%	3.3%	4.1%	16.2%	2.2%	0.0%	4.1%	1.5%
	22R	33.6%	20.9%	4.5%	6.7%	27.6%	19.1%	23.2%	0.0%	26.8%	3.1%
	27L	0.1%	0.0%	2.0%	0.0%	1.4%	0.1%	1.7%	0.0%	1.6%	1.5%
	27R	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.4%	0.0%	0.3%	1.5%

FNT Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	27.9%	18.8%	31.5%	25.6%	37.3%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	19.0%	19.1%	15.7%	41.5%	16.8%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	47.3%	59.2%	45.9%	31.7%	42.1%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	5.8%	3.0%	6.9%	1.2%	3.9%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	27.9%	18.8%	31.5%	25.6%	31.8%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	19.0%	19.1%	15.7%	41.5%	18.0%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	47.3%	59.2%	45.9%	31.7%	46.5%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	5.8%	3.0%	6.9%	1.2%	3.7%	0.0%

FNT Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	9.8%	19.0%	18.5%	34.5%	16.2%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	12.5%	3.2%	7.5%	6.9%	3.1%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	65.4%	50.0%	63.0%	51.7%	55.6%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	12.3%	27.7%	11.1%	6.9%	25.1%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	10.2%	19.8%	18.5%	34.5%	15.2%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	12.3%	2.6%	7.5%	6.9%	2.4%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	64.4%	49.3%	63.0%	51.7%	59.0%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	13.1%	28.3%	11.1%	6.9%	23.4%	0.0%

MFD Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	11.3%	20.0%	7.0%	0.0%	14.7%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	25.3%	20.0%	34.9%	0.0%	32.4%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	63.4%	60.0%	58.1%	0.0%	52.9%	0.0%
2011	5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	10.4%	20.0%	7.0%	0.0%	14.7%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	25.6%	20.0%	34.9%	0.0%	32.4%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	64.1%	60.0%	58.1%	0.0%	52.9%	0.0%

MFD Future No Action
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	5	0.0%	0.0%	0.0%	0.0%	19.2%	0.0%	31.0%	0.0%	17.7%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	19.1%	0.0%	33.0%	0.0%	23.1%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	17.2%	0.0%	19.2%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	45.0%	0.0%	18.7%	0.0%	40.0%	0.0%
2011	5	0.0%	0.0%	0.0%	0.0%	18.4%	0.0%	31.0%	0.0%	17.7%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	19.2%	0.0%	33.0%	0.0%	23.1%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	16.8%	0.0%	17.2%	0.0%	19.2%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	45.6%	0.0%	18.7%	0.0%	40.0%	0.0%

MTC Future No Action
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	61.6%	0.0%	49.9%	33.4%	0.0%	0.0%	37.6%	0.0%	0.0%	0.0%
	19	38.4%	0.0%	50.1%	66.6%	0.0%	0.0%	62.4%	0.0%	0.0%	0.0%
2011	1	61.6%	0.0%	49.9%	33.4%	0.0%	0.0%	37.6%	0.0%	0.0%	0.0%
	19	38.4%	0.0%	50.1%	66.6%	0.0%	0.0%	62.4%	0.0%	0.0%	0.0%

MTC Future No Action Arrival Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	50.6%	0.0%	47.4%	33.4%	0.0%	0.0%	43.3%	0.0%	0.0%	0.0%
	19	49.4%	0.0%	52.6%	66.6%	0.0%	0.0%	56.7%	0.0%	0.0%	0.0%
2011	1	50.6%	0.0%	47.4%	33.4%	0.0%	0.0%	43.3%	0.0%	0.0%	0.0%
	19	49.4%	0.0%	52.6%	66.6%	0.0%	0.0%	56.7%	0.0%	0.0%	0.0%

PTK Future No Action Departure Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	09L	0.0%	0.0%	0.0%	0.0%	4.5%	3.1%	8.1%	0.8%	14.0%	5.2%
	09R	0.0%	0.0%	0.0%	0.0%	39.5%	34.5%	37.6%	32.3%	26.7%	23.4%
	27L	0.0%	0.0%	0.0%	0.0%	49.4%	53.1%	47.0%	64.6%	38.2%	62.4%
	27R	0.0%	0.0%	0.0%	0.0%	6.6%	9.3%	7.2%	2.3%	21.1%	9.1%
2011	09L	0.0%	0.0%	0.0%	0.0%	4.4%	2.8%	8.0%	0.8%	14.0%	5.2%
	09R	0.0%	0.0%	0.0%	0.0%	39.6%	34.8%	37.7%	32.3%	26.6%	23.4%
	27L	0.0%	0.0%	0.0%	0.0%	49.5%	53.9%	47.2%	64.6%	38.1%	62.4%
	27R	0.0%	0.0%	0.0%	0.0%	6.5%	8.4%	7.1%	2.3%	21.2%	9.1%

PTK Future No Action Arrival Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	09L	0.0%	0.0%	0.0%	0.0%	5.5%	6.3%	8.6%	4.7%	11.7%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	37.3%	41.7%	34.6%	48.5%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	47.8%	40.4%	44.4%	39.1%	37.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	9.3%	11.5%	12.4%	7.7%	19.5%	0.0%
2011	09L	0.0%	0.0%	0.0%	0.0%	5.4%	0.0%	8.5%	6.3%	11.8%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	34.7%	41.7%	31.6%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	48.0%	0.0%	44.4%	40.4%	37.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	9.1%	0.0%	12.4%	11.5%	19.6%	0.0%

TOL Future No Action Departure Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	52.0%	0.0%	0.0%	0.0%	30.6%	34.6%	24.0%	23.5%	40.4%	100.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	48.0%	0.0%	0.0%	0.0%	69.4%	65.4%	76.0%	76.5%	59.6%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	7	52.0%	0.0%	0.0%	0.0%	30.6%	34.6%	24.0%	23.5%	40.4%	100.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	48.0%	0.0%	0.0%	0.0%	69.4%	65.4%	76.0%	76.5%	59.6%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

TOL Future No Action Arrival Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	42.9%	0.0%	0.0%	0.0%	33.2%	53.0%	43.4%	42.5%	12.1%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	4.5%
	25	57.1%	0.0%	0.0%	0.0%	66.8%	47.0%	56.6%	57.5%	86.2%	95.5%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	7	42.9%	0.0%	0.0%	0.0%	33.2%	53.0%	43.4%	42.5%	12.1%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	4.5%
	25	57.1%	0.0%	0.0%	0.0%	66.8%	47.0%	56.6%	57.5%	86.2%	95.5%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

YIP Future No Action Departure Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	05L	0.0%	0.0%	0.0%	0.0%	20.0%	23.3%	16.3%	23.6%	17.9%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	26.7%	40.6%	28.5%	31.8%	17.7%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	26.4%	19.4%	28.6%	27.1%	27.5%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	20.6%	16.7%	18.0%	15.4%	27.2%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	5.6%	0.0%	5.8%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	3.0%	0.0%	3.0%	2.1%	4.0%	0.0%
2011	05L	0.0%	0.0%	0.0%	0.0%	19.9%	23.3%	16.8%	25.2%	17.9%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	26.7%	40.6%	28.2%	31.5%	17.7%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	26.4%	19.4%	28.6%	24.7%	27.5%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	20.5%	16.7%	18.0%	16.4%	27.2%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	5.1%	0.0%	5.8%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	3.4%	2.2%	4.0%	0.0%

YIP Future No Action
Arrival Runway Use Percentages

A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	05L	0.0%	0.0%	0.0%	0.0%	13.1%	15.5%	10.7%	5.4%	24.7%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	38.1%	40.8%	32.8%	42.8%	21.0%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	38.2%	32.1%	43.8%	43.7%	22.6%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	10.5%	11.6%	12.7%	8.1%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	05L	0.0%	0.0%	0.0%	0.0%	12.9%	19.0%	10.7%	5.4%	24.7%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	38.3%	38.1%	32.8%	42.8%	21.0%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	38.5%	29.0%	43.8%	43.7%	22.6%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	10.3%	14.0%	12.7%	8.1%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Metron Aviation Inc./HMMH, 2005

Future Alternative

7D2 Future Alternative Departure Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.6%	0.0%	35.3%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.4%	0.0%	64.7%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.6%	0.0%	35.3%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.4%	0.0%	64.7%	0.0%

7D2 Future Alternative Arrival Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.4%	0.0%	45.6%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.6%	0.0%	54.4%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.4%	0.0%	45.6%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.6%	0.0%	54.4%	0.0%

ARB Future Alternative Departure Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.6%	0.0%	36.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.4%	0.0%	63.2%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.6%	0.0%	36.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.4%	0.0%	63.2%	0.0%

ARB Future Alternative Arrival Runway Use Percentages											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.6%	0.0%	39.9%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.4%	0.0%	60.1%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.6%	0.0%	39.9%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.4%	0.0%	60.1%	0.0%

BKL Future Alternative
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	0.0%	0.0%	0.0%	0.0%	46.7%	47.0%	44.4%	41.1%	37.0%	48.1%
	06R	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%	4.1%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	6.1%	10.7%	9.5%	12.0%	1.1%	11.5%
	24R	0.0%	0.0%	0.0%	0.0%	44.9%	42.3%	46.1%	46.9%	57.8%	40.4%
2011	06L	0.0%	0.0%	0.0%	0.0%	47.3%	47.0%	44.4%	41.1%	35.4%	48.1%
	06R	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	4.8%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	6.2%	10.7%	9.5%	12.0%	1.1%	11.5%
	24R	0.0%	0.0%	0.0%	0.0%	44.6%	42.3%	46.1%	46.9%	58.7%	40.4%

BKL Future Alternative
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	0.0%	0.0%	0.0%	0.0%	23.9%	22.2%	20.7%	25.1%	18.7%	0.0%
	06R	0.0%	0.0%	0.0%	0.0%	15.0%	10.7%	9.1%	9.3%	19.3%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	24R	0.0%	0.0%	0.0%	0.0%	61.1%	67.0%	70.2%	65.6%	62.0%	0.0%
2011	06L	0.0%	0.0%	0.0%	0.0%	24.3%	22.2%	20.7%	25.1%	18.5%	0.0%
	06R	0.0%	0.0%	0.0%	0.0%	14.5%	10.7%	9.1%	9.3%	20.7%	0.0%
	24L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	24R	0.0%	0.0%	0.0%	0.0%	61.2%	67.0%	70.2%	65.6%	60.8%	0.0%

CAK Future Alternative
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	100.0%	0.0%	0.0%	0.0%	33.6%	29.6%	22.3%	22.4%	22.6%	38.0%
	5	0.0%	0.0%	0.0%	0.0%	6.6%	2.2%	7.8%	5.3%	12.6%	19.7%
	19	0.0%	0.0%	0.0%	0.0%	4.9%	5.9%	7.9%	0.5%	14.6%	0.4%
	23	0.0%	0.0%	0.0%	0.0%	55.0%	62.4%	61.9%	71.8%	50.3%	42.0%
2011	1	100.0%	0.0%	0.0%	0.0%	33.6%	29.6%	22.4%	22.5%	22.6%	38.0%
	5	0.0%	0.0%	0.0%	0.0%	6.6%	2.2%	7.8%	5.3%	12.6%	19.7%
	19	0.0%	0.0%	0.0%	0.0%	4.9%	5.9%	7.9%	0.4%	14.6%	0.4%
	23	0.0%	0.0%	0.0%	0.0%	54.8%	62.4%	61.9%	71.8%	50.3%	42.0%

CAK Future Alternative
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	100.0%	0.0%	0.0%	0.0%	31.0%	33.6%	33.1%	27.5%	30.6%	26.1%
	5	0.0%	0.0%	0.0%	0.0%	12.9%	21.1%	11.1%	7.6%	14.1%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	16.2%	11.3%	14.1%	6.1%	17.1%	13.1%
	23	0.0%	0.0%	0.0%	0.0%	39.8%	34.0%	41.7%	58.7%	38.2%	60.9%
2011	1	100.0%	0.0%	0.0%	0.0%	31.0%	33.6%	33.1%	27.5%	30.7%	26.1%
	5	0.0%	0.0%	0.0%	0.0%	13.0%	21.1%	11.1%	7.6%	13.7%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	16.4%	11.3%	14.1%	6.1%	17.3%	13.1%
	23	0.0%	0.0%	0.0%	0.0%	39.7%	34.0%	41.7%	58.7%	38.3%	60.9%

CGF Future Alternative
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	43.5%	43.2%	45.9%	0.0%	40.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	56.5%	56.8%	54.1%	0.0%	59.2%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	43.5%	43.2%	45.9%	0.0%	40.8%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	56.5%	56.8%	54.1%	0.0%	59.2%	0.0%

CGF Future Alternative
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	6	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	38.0%	0.0%	46.1%	50.0%
	24	0.0%	0.0%	0.0%	0.0%	63.7%	0.0%	62.0%	100.0%	53.9%	50.0%
2011	6	0.0%	0.0%	0.0%	0.0%	37.3%	14.3%	38.0%	0.0%	46.1%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	62.7%	85.7%	62.0%	100.0%	53.9%	0.0%

CLE Future Alternative
Departure Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	31.8%	31.8%	22.5%	4.0%	21.4%	22.3%	31.8%	4.0%	18.8%	9.9%
	06R	7.8%	7.8%	16.9%	35.1%	18.3%	18.2%	7.8%	35.1%	18.0%	29.1%
	10	0.4%	0.4%	0.3%	0.1%	0.3%	0.3%	0.4%	0.1%	0.2%	0.2%
	24L	11.8%	11.8%	25.6%	53.0%	27.3%	26.3%	11.8%	53.0%	22.1%	44.0%
	24R	47.8%	47.8%	33.9%	6.0%	31.7%	32.1%	47.8%	6.0%	40.2%	15.3%
	28	0.4%	0.4%	0.9%	1.8%	0.9%	0.8%	0.4%	1.8%	0.7%	1.5%
2011	06L	7.8%	7.8%	16.2%	35.1%	18.5%	20.3%	7.8%	35.1%	16.1%	29.2%
	06R	31.8%	31.8%	23.2%	4.0%	21.6%	20.2%	31.8%	4.0%	16.4%	9.6%
	10	0.4%	0.4%	0.3%	0.1%	0.3%	0.3%	0.4%	0.1%	0.2%	0.2%
	24L	11.8%	11.8%	24.5%	53.0%	26.7%	29.4%	11.8%	53.0%	24.3%	44.1%
	24R	47.8%	47.8%	34.9%	6.0%	32.0%	28.9%	47.8%	6.0%	42.2%	15.4%
	28	0.4%	0.4%	0.8%	1.8%	0.9%	0.9%	0.4%	1.8%	0.8%	1.5%

CLE Future Alternative **Arrival Runway Use Percentages**											
A/C Category>>		**H**		**K**		**M**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	06L	35.8%	35.8%	17.2%	4.0%	17.2%	26.6%	24.2%	4.0%	11.5%	4.0%
	06R	3.9%	3.9%	22.1%	35.1%	22.9%	13.8%	19.1%	35.1%	25.3%	35.1%
	10	0.5%	0.5%	0.2%	0.0%	0.2%	0.3%	0.0%	0.0%	0.1%	0.0%
	24L	5.9%	5.9%	33.4%	53.1%	33.2%	19.3%	32.3%	53.1%	44.3%	53.1%
	24R	53.8%	53.8%	25.9%	6.0%	25.4%	39.3%	23.8%	6.0%	17.3%	6.0%
	28	0.2%	0.2%	1.1%	1.8%	1.1%	0.6%	0.5%	1.8%	1.5%	1.8%
2011	06L	35.8%	35.8%	18.7%	4.0%	17.4%	27.7%	20.0%	4.0%	11.9%	4.0%
	06R	3.9%	3.9%	20.7%	35.1%	22.6%	12.6%	22.1%	35.1%	27.3%	35.1%
	10	0.4%	0.5%	0.2%	0.0%	0.2%	0.4%	0.0%	0.0%	0.2%	0.0%
	24L	5.9%	5.9%	31.3%	53.1%	33.1%	17.7%	38.5%	53.1%	41.3%	53.1%
	24R	53.8%	53.8%	28.0%	6.0%	25.6%	41.0%	18.6%	6.0%	17.9%	6.0%
	28	0.2%	0.2%	1.1%	1.8%	1.1%	0.6%	0.7%	1.8%	1.4%	1.8%

CYQG Future Alternative **Departure Runway Use Percentages**											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%	45.5%	65.5%	60.8%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	15.2%	0.0%	9.8%	3.3%	12.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	39.8%	0.0%	14.5%	8.2%	15.9%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	12.0%	0.0%	30.1%	23.0%	10.4%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%	45.5%	65.5%	60.8%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	15.2%	0.0%	9.8%	3.3%	12.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	39.8%	0.0%	14.5%	8.2%	15.9%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	12.0%	0.0%	30.1%	23.0%	10.4%	0.0%

CYQG Future Alternative **Arrival Runway Use Percentages**											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	30.4%	20.0%	18.8%	7.1%	31.0%	40.0%
	12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	47.4%	70.0%	63.1%	85.7%	60.3%	60.0%
	30	0.0%	0.0%	0.0%	0.0%	22.2%	10.0%	18.1%	7.1%	8.6%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	30.4%	20.0%	18.8%	7.1%	31.0%	40.0%
	12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	47.4%	70.0%	63.1%	85.7%	60.3%	60.0%
	30	0.0%	0.0%	0.0%	0.0%	22.2%	10.0%	18.1%	7.1%	8.6%	0.0%

DET Future Alternative Departure Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.4%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	31.9%	21.9%	40.5%	30.6%	26.3%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	5.6%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	65.8%	78.1%	59.5%	69.4%	66.8%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.4%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	31.9%	21.9%	40.5%	30.6%	26.3%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	5.6%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	65.8%	78.1%	59.5%	69.4%	66.8%	0.0%

DET Future Alternative Arrival Runway Use Percentages											
A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	39.9%	51.2%	37.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	6.7%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	61.6%	0.0%	60.1%	48.8%	53.8%	0.0%
2011	7	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	1.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	36.3%	0.0%	39.9%	51.2%	37.9%	0.0%
	25	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	6.7%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	61.6%	0.0%	60.1%	48.8%	53.8%	0.0%

DTW Future Alternative
Departure Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	03L	1.5%	3.6%	19.3%	13.8%	15.1%	11.1%	14.4%	0.0%	10.9%	8.2%
	03R	0.4%	12.5%	13.0%	9.0%	3.5%	1.4%	4.2%	0.0%	5.9%	13.6%
	04L	1.1%	4.9%	0.1%	0.0%	0.5%	0.8%	0.1%	0.0%	0.7%	0.0%
	04R	39.3%	17.4%	12.4%	7.4%	27.6%	25.5%	11.1%	0.0%	23.2%	10.1%
	09L	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	0.3%	0.0%	0.8%	5.6%
	09R	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.2%	0.0%	0.1%	0.7%
	21L	1.1%	9.4%	24.5%	21.4%	6.6%	9.5%	19.7%	0.0%	8.9%	17.4%
	21R	2.3%	26.8%	22.3%	27.9%	14.1%	15.3%	32.5%	0.0%	15.6%	12.7%
	22L	49.3%	24.2%	8.3%	11.6%	30.9%	34.6%	17.5%	0.0%	29.0%	18.7%
	22R	5.0%	1.2%	0.1%	8.4%	1.4%	1.4%	0.2%	0.0%	1.2%	9.1%
	27L	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.0%	0.0%	0.5%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	3.8%
2011	03L	1.2%	3.6%	20.8%	10.3%	14.8%	10.5%	17.3%	0.0%	10.8%	8.6%
	03R	0.4%	12.2%	12.1%	10.4%	3.3%	1.3%	6.1%	0.0%	8.6%	11.4%
	04L	1.1%	4.0%	0.1%	0.0%	0.6%	0.7%	0.0%	0.0%	0.7%	0.0%
	04R	40.4%	16.2%	11.2%	12.7%	28.1%	25.8%	9.7%	0.0%	22.3%	10.9%
	09L	0.0%	0.0%	0.1%	0.2%	0.0%	0.1%	4.3%	0.0%	0.8%	5.2%
	09R	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.5%	0.0%	0.1%	0.7%
	21L	1.0%	10.0%	25.7%	17.9%	6.3%	9.5%	17.5%	0.0%	9.1%	15.0%
	21R	2.2%	26.8%	25.1%	20.9%	13.7%	16.1%	30.9%	0.0%	15.1%	13.5%
	22L	48.5%	27.3%	4.6%	21.2%	31.5%	34.7%	13.1%	0.0%	28.1%	22.1%
	22R	5.2%	0.0%	0.2%	6.3%	1.4%	1.2%	0.5%	0.0%	1.1%	8.4%
	27L	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.5%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	4.2%

DTW Future Alternative
Arrival Runway Use Percentages

A/C Category>>		H		K		M		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	03L	0.0%	0.0%	6.3%	1.7%	2.2%	1.3%	8.2%	0.0%	2.4%	4.6%
	03R	11.9%	19.7%	28.0%	19.4%	15.7%	8.1%	29.1%	0.0%	16.9%	38.5%
	04L	24.1%	40.5%	5.5%	46.1%	20.1%	22.8%	3.8%	0.0%	19.7%	33.8%
	04R	6.5%	7.7%	1.9%	0.0%	2.9%	15.8%	0.6%	0.0%	3.5%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	21L	16.2%	11.3%	41.1%	12.2%	21.6%	11.7%	37.3%	0.0%	20.7%	15.4%
	21R	0.0%	0.0%	8.2%	10.6%	2.7%	3.9%	12.7%	0.0%	1.7%	0.0%
	22L	10.3%	2.6%	2.7%	3.3%	4.2%	17.6%	3.8%	0.0%	4.2%	1.5%
	22R	31.0%	18.2%	4.1%	6.7%	29.2%	18.6%	2.5%	0.0%	29.2%	3.1%
	27L	0.1%	0.0%	2.1%	0.0%	1.1%	0.1%	0.6%	0.0%	1.5%	1.5%
	27R	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	1.3%	0.0%	0.3%	1.5%
2011	03L	0.0%	0.0%	5.9%	1.7%	2.1%	1.1%	3.8%	0.0%	2.5%	4.6%
	03R	10.5%	18.0%	27.3%	19.4%	15.3%	7.7%	18.3%	0.0%	17.9%	38.5%
	04L	25.4%	41.1%	6.1%	46.1%	20.7%	24.2%	15.1%	0.0%	18.3%	33.8%
	04R	6.5%	6.3%	2.0%	0.0%	3.0%	15.1%	0.4%	0.0%	3.5%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	21L	13.6%	9.6%	41.1%	12.2%	20.7%	10.2%	30.2%	0.0%	21.9%	15.4%
	21R	0.0%	0.0%	8.3%	10.6%	2.5%	3.5%	4.7%	0.0%	1.8%	0.0%
	22L	10.2%	4.1%	2.8%	3.3%	4.2%	17.2%	2.2%	0.0%	4.2%	1.5%
	22R	33.6%	20.9%	4.5%	6.7%	30.1%	20.8%	23.2%	0.0%	28.0%	3.1%
	27L	0.1%	0.0%	2.0%	0.0%	1.1%	0.1%	1.7%	0.0%	1.5%	1.5%
	27R	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.4%	0.0%	0.3%	1.5%

FNT Future Alternative
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	27.9%	18.8%	31.5%	25.6%	37.3%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	19.0%	19.1%	15.7%	41.5%	16.8%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	47.3%	59.2%	45.9%	31.7%	42.1%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	5.8%	3.0%	6.9%	1.2%	3.9%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	27.9%	18.8%	31.5%	25.6%	31.8%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	19.0%	19.1%	15.7%	41.5%	18.0%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	47.3%	59.2%	45.9%	31.7%	46.5%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	5.8%	3.0%	6.9%	1.2%	3.7%	0.0%

FNT Future Alternative
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	9	0.0%	0.0%	0.0%	0.0%	10.2%	19.4%	18.5%	34.5%	16.2%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	12.4%	3.8%	7.5%	6.9%	3.1%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	65.1%	50.3%	63.0%	51.7%	55.6%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	12.3%	26.5%	11.1%	6.9%	25.1%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	11.8%	19.8%	18.5%	34.5%	15.2%	0.0%
	18	0.0%	0.0%	0.0%	0.0%	12.0%	2.6%	7.5%	6.9%	2.4%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	63.1%	49.3%	63.0%	51.7%	59.0%	0.0%
	36	0.0%	0.0%	0.0%	0.0%	13.1%	28.3%	11.1%	6.9%	23.4%	0.0%

MFD Future Alternative
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	11.3%	20.0%	7.0%	0.0%	14.7%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	25.3%	20.0%	34.9%	0.0%	32.4%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	63.4%	60.0%	58.1%	0.0%	52.9%	0.0%
2011	5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	10.4%	20.0%	7.0%	0.0%	14.7%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	25.6%	20.0%	34.9%	0.0%	32.4%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	64.1%	60.0%	58.1%	0.0%	52.9%	0.0%

MFD Future Alternative
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	5	0.0%	0.0%	0.0%	0.0%	19.2%	0.0%	31.0%	0.0%	17.7%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	19.1%	0.0%	33.0%	0.0%	23.1%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	17.2%	0.0%	19.2%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	45.0%	0.0%	18.7%	0.0%	40.0%	0.0%
2011	5	0.0%	0.0%	0.0%	0.0%	18.4%	0.0%	31.0%	0.0%	17.7%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	19.2%	0.0%	33.0%	0.0%	23.1%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	16.8%	0.0%	17.2%	0.0%	19.2%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	45.6%	0.0%	18.7%	0.0%	40.0%	0.0%

MTC Future Alternative
Departure Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	61.6%	0.0%	49.9%	33.4%	0.0%	0.0%	37.6%	0.0%	0.0%	0.0%
	19	38.4%	0.0%	50.1%	66.6%	0.0%	0.0%	62.4%	0.0%	0.0%	0.0%
2011	1	61.6%	0.0%	49.9%	33.4%	0.0%	0.0%	37.6%	0.0%	0.0%	0.0%
	19	38.4%	0.0%	50.1%	66.6%	0.0%	0.0%	62.4%	0.0%	0.0%	0.0%

MTC Future Alternative **Arrival Runway Use Percentages**											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	1	50.6%	0.0%	47.4%	33.4%	0.0%	0.0%	43.3%	0.0%	0.0%	0.0%
	19	49.4%	0.0%	52.6%	66.6%	0.0%	0.0%	56.7%	0.0%	0.0%	0.0%
2011	1	50.6%	0.0%	47.4%	33.4%	0.0%	0.0%	43.3%	0.0%	0.0%	0.0%
	19	49.4%	0.0%	52.6%	66.6%	0.0%	0.0%	56.7%	0.0%	0.0%	0.0%

PTK Future Alternative **Departure Runway Use Percentages**											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	09L	0.0%	0.0%	0.0%	0.0%	4.5%	3.1%	8.1%	0.8%	14.0%	5.2%
	09R	0.0%	0.0%	0.0%	0.0%	39.5%	34.5%	37.6%	32.3%	26.7%	23.4%
	27L	0.0%	0.0%	0.0%	0.0%	49.4%	53.1%	47.0%	64.6%	38.2%	62.4%
	27R	0.0%	0.0%	0.0%	0.0%	6.6%	9.3%	7.2%	2.3%	21.1%	9.1%
2011	09L	0.0%	0.0%	0.0%	0.0%	4.4%	2.8%	8.0%	0.8%	14.0%	5.2%
	09R	0.0%	0.0%	0.0%	0.0%	39.6%	34.8%	37.7%	32.3%	26.6%	23.4%
	27L	0.0%	0.0%	0.0%	0.0%	49.5%	53.9%	47.2%	64.6%	38.1%	62.4%
	27R	0.0%	0.0%	0.0%	0.0%	6.5%	8.4%	7.1%	2.3%	21.2%	9.1%

PTK Future Alternative **Arrival Runway Use Percentages**											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	09L	0.0%	0.0%	0.0%	0.0%	5.5%	6.3%	8.6%	4.8%	11.7%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	37.3%	41.7%	34.6%	48.5%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	47.8%	40.4%	44.4%	39.0%	37.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	9.3%	11.5%	12.4%	7.7%	19.5%	0.0%
2011	09L	0.0%	0.0%	0.0%	0.0%	5.4%	6.3%	8.5%	0.0%	11.8%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	37.5%	41.7%	34.7%	0.0%	31.6%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	48.0%	40.4%	44.4%	0.0%	37.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	9.1%	11.5%	12.4%	0.0%	19.6%	0.0%

TOL Future Alternative **Departure Runway Use Percentages**											
A/C Category>>		**Mtac**		**Mtrans**		**J**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	52.0%	0.0%	0.0%	0.0%	30.6%	34.6%	24.0%	23.5%	40.4%	100.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	48.0%	0.0%	0.0%	0.0%	69.4%	65.4%	76.0%	76.5%	59.6%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	7	52.0%	0.0%	0.0%	0.0%	30.6%	34.6%	24.0%	23.5%	40.4%	100.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25	48.0%	0.0%	0.0%	0.0%	69.4%	65.4%	76.0%	76.5%	59.6%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

TOL Future Alternative Arrival Runway Use Percentages											
	A/C Category>>	Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	7	42.9%	0.0%	0.0%	0.0%	33.2%	53.0%	43.4%	42.5%	11.6%	13.6%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.3%	5.1%
	25	57.1%	0.0%	0.0%	0.0%	66.8%	47.0%	56.6%	57.5%	86.2%	81.4%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	7	42.9%	0.0%	0.0%	0.0%	33.2%	53.0%	43.4%	42.5%	12.1%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	4.5%
	25	57.1%	0.0%	0.0%	0.0%	66.8%	47.0%	56.6%	57.5%	86.2%	95.5%
	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

YIP Future Alternative Departure Runway Use Percentages											
	A/C Category>>	Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	05L	0.0%	0.0%	0.0%	0.0%	20.0%	23.3%	16.3%	23.6%	17.9%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	26.7%	40.6%	28.5%	31.8%	17.7%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	26.4%	19.4%	28.6%	27.1%	27.5%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	20.6%	16.7%	18.0%	15.4%	27.2%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	5.6%	0.0%	5.8%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	3.0%	0.0%	3.0%	2.1%	4.0%	0.0%
2011	05L	0.0%	0.0%	0.0%	0.0%	19.9%	23.3%	16.8%	25.2%	17.9%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	26.7%	40.6%	28.2%	31.5%	17.7%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	26.4%	19.4%	28.6%	24.7%	27.5%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	20.5%	16.7%	18.0%	16.4%	27.2%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	5.1%	0.0%	5.8%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	3.4%	2.2%	4.0%	0.0%

YIP Future Alternative
Arrival Runway Use Percentages

A/C Category>>		Mtac		Mtrans		J		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2006	05L	0.0%	0.0%	0.0%	0.0%	13.1%	15.5%	10.7%	5.4%	24.7%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	38.1%	40.8%	32.8%	42.8%	21.0%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	38.2%	32.1%	43.8%	43.7%	22.6%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	10.5%	11.6%	12.7%	8.1%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	05L	0.0%	0.0%	0.0%	0.0%	12.9%	19.0%	10.7%	5.4%	24.7%	0.0%
	05R	0.0%	0.0%	0.0%	0.0%	38.3%	38.1%	32.8%	42.8%	21.0%	0.0%
	09L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	09R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	23L	0.0%	0.0%	0.0%	0.0%	38.5%	29.0%	43.8%	43.7%	22.6%	0.0%
	23R	0.0%	0.0%	0.0%	0.0%	10.3%	14.0%	12.7%	8.1%	31.7%	0.0%
	27L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Metron Aviation Inc./HMMH, 2005

Attachment B

AIRCRAFT LOOKUP TABLE

Aircraft Type	Description	NIRS Aircraft Substitution Arrivals	Departures
A306	Airbus A300-600ST	A300	A300
A310	Airbus A310-304 / CF6-80C2A2	A310	A310
A319	Airbus A319-131 / V2522-A5 Engines	737300	A319
A320	Airbus A320-211 CFM56-5A1	737300	A320
A321	Airbus A320-100	737300	A320
A332	Airbus A330-200	A310	A330
A333	Airbus A330-300	A310	A330
A343	Airbus A340-300	DC870	A340
AC95	Aero Commander 695	CNA441	CNA441
AEST	Piper Aero Star 600/700	BEC58P	BEC58P
ASTR	Isreal & Astro Jet - Astre 1125 Westwind	IA1125	IA1125
B190	Beech 1900	DHC6	DHC6
B350	Beech Super King Air 350	DHC6	DHC6
B712	Boeing 717-200	717200	717200
B722Q	Boeing 727-200/100 Stage 3	727EM2	727EM2
B732	Boeing 737-200	737N17	737N17
B733	Boeing 737-300	737300	737300
B734	Boeing 737-400	737400	737400
B735	Boeing 737-500	737500	737500
B737	Boeing 737-700	737700	737700
B738	Boeing 737-800	737700	737700
B739	Boeing 737-900	737700	737700
B744	Boeing 747-400	747400	747400
B752	Boeing 757-200	757PW	757PW
B753	Boeing 757-300	757RR	757RR
B772	Boeing 777-200	767300	777200
BE10	Beech King Air 100 a/B	CNA441	CNA441
BE20	Beech Super King Air 200, 1300	DHC6	DHC6
BE30	Beech Super King Air 300/300LW	DHC6	DHC6
BE36	Beech Bonanza 36	GASEPV	GASEPV
BE40	Beech Beechjet 400/T-1 Jayhawk	MU3001	MU3001
BE55	Beech Baron55/Chochise	BEC58P	BEC58P
BE58	Beech Baron58, Foxstar	BEC58P	BEC58P
BE9L	Beech KingAir90, A90 to E90	CNA441	CNA441
C130	C-130H/T56-A-15	C130	C130
C172	Cessna Skyhawk 172/Ctlass/Mescalero	CNA172	CNA172
C182	Cessna Skylane 182	GASEPV	GASEPV
C208	Cessna Caravan 1-208, (Super) Cargomaster, Grand Caravan (U27)	GASEPF	GASEPF
C210	Cessna Centurion 210, Turbo Centurion	GASEPV	GASEPV
C212	Casa C212 Aviocar	DHC6	DHC6
C25A	Cessna 525A Citation CJ2	CNA500	CNA500
C310	Cessna 310/Riley 65, Rocket	BEC58P	BEC58P
C340	Cessna 340	BEC58P	BEC58P
C414	Cessna Chancellor 414, Rocket Power	BEC58P	BEC58P
C421	Cesssna Golden Eagle 421	BEC58P	BEC58P
C441	Cessna Conquest/Conquest 2 - 441	CNA441	CNA441
C500	Cessna Citation 1	CNA500	CNA500
C550	Cessna Citation 2	MU3001	MU3001
C560	Cessna Citation 5	MU3001	MU3001
C650	Cessna Citation 3/6/7	CIT3	CIT3
C750	Cessna Citation 10	CNA750	CNA750
CL60	Canadair - CL600/610 Challenger	CL600	CL600
CL64	Canadair CL604	CL601	CL601
CRJ1	CL-600 Regional Jet CRJ-100, RJ-100	CL601	CL601
CRJ7	CL-600 Regional Jet CRJ-700	CL601	CL601
CVLT	Convair 580, 600, and 640	CVR580	CVR580
D328	Domier GmbH - Do 328 Series	DHC8	DHC8

DC10	McDonnell Douglas DC-10 (all series)	DC1030	DC1030
DC1010	McDonnell Douglas DC-10 (all series)	DC1010	DC1010
DC1030	DC10-30/CF6-50C2	DC1030	DC1030
DC86	McDonnell Douglas DC8-60	DC8QN	DC8QN
DC87	McDonnell Douglas DC8-70	DC870	DC870
DC93Q	McDonnell Douglas DC-9 Stage 3	DC93LW	DC93LW
DC95Q	McDonnell Douglas DC-9 Stage 3	DC95HW	DC95HW
DH8A	Dehavilland Dash 8, DHC8 - 100	DHC8	DHC8
DH8C	Dehavilland Dash 8, DHC8 - 100 Dash 8 (E-9, CT-142, CC-142)	DHC830	DHC830
E110	Embraer EMB-110	DHC6	DHC6
E135	Embraer EMB-135	CL600	CL600
E145	Embraer EMB-145	EMB145	EMB145
E170	Embraer EMB-170/175	GV	GV
E190	Embraer EMB-190	GV	GV
E45L	Embraer EMB-145	EMB14L	EMB14L
E45X	Embraer EMB-145XR	EMB145	EMB145
F100	Fokker VB 100	F10065	F10065
F16	General Dynamics Fighting Falcon	F16A	F16A
F2TH	Dassault-Breguet Falcon 2000	CL600	CL600
F70	Fokker 70	F10062	F10062
F900	Dassault Breguet Falcon 900, Mysters 900	FAL50	FAL50
FA10	Dassault Breguet Falcon 10, Mysters 10	LEAR35	LEAR35
FA20	Dassault Breguet Falcon 20, Mysters 20	FAL20	FAL20
FA50	Dassault Breguet Falcon 50, Mysters 50	FAL50	FAL50
GALX	1126 Gulfstream 200	IA1125	IA1125
GLF2	Gulfstream 2	GIIB	GIIB
GLF3	Gulfstream 3	GIIB	GIIB
GLF4	Gulfstream 4	GIV	GIV
GLF5	Gulfstream 5	GV	GV
H25B	British Aerospace BAe HS 125 Series 700/800	LEAR35	LEAR35
H25C	British Aerospace BAe HS 125	LEAR35	LEAR35
J328	Fairchid Dornier 328JET, Envoy 3	CL600	CL600
JS31	British Aerospace BAe-3100 Jetstream 31	DHC6	DHC6
JS32	British Aerospace BAe-3100 Jetstream 32	DHC6	DHC6
K35E	KC 135D/E Stratotanker (TF33 engines)	707320	707320
K35R	Boeing Stratotanker KC-135 (CFM56 engines)	KC135R	KC135R
L188	L188C/ALL 501-D13	L188	L188
LJ24	Learjet 24	LEAR25	LEAR25
LJ25	Learjet 25	LEAR25	LEAR25
LJ31	Learjet 31	LEAR35	LEAR35
LJ35	Learjet 35,36	LEAR35	LEAR35
LJ36	Learjet 36	LEAR35	LEAR35
LJ45	Learjet 45	LEAR35	LEAR35
LJ55	Learjet 55	LEAR35	LEAR35
LJ60	Learjet 60	LEAR35	LEAR35
M20P	Mooney Corp M20	GASEPV	GASEPV
MD11	McDonnell-Douglas MD-11	DC1040	MD11GE
MD80	McDonnell-Douglas MD80	MD81	MD81
MD81	MD-81/JT8D-209	MD81	MD81
MD82	MD-82/JT8D-217A	MD82	MD82
MD83	MD-83/JT8D-219	MD83	MD83
MD88	McDonnell-Douglas MD88	MD83	MD83
MU2	Mitsubishi MU-2	DHC6	DHC6
P180	P-180 Avanti	SD330	SD330
P3	Lockheed-Orion Aurora	L188	L188
PA28	Piper Cherokee, Archer, Dakota/Warr	GASEPV	GASEPV
PA30	Piper PA-30 Twin Comanche	BEC58P	BEC58P
PA31	Piper PA-31 Navajo	BEC58P	BEC58P
PA32	Piper PA-32 Lance	GASEPV	GASEPV

PA34	Piper PA-34 Seneca	BEC58P	BEC58P
PA46	Piper PA-46 Malibu	GASEPV	GASEPV
PAY2	Piper Cheyenne 2	CNA441	CNA441
PAY3	Piper Cheyenne 3	CNA441	CNA441
PC12	PILATUS PC-12	GASEPV	GASEPV
RJ85	British Aerospace AVRO RJ Series	BAE146	BAE146
SBR1	Rockwell - Sabreliner 65/40/50/60	LEAR25	LEAR25
SBR2	Rockwell - Sabreliner	LEAR25	LEAR25
SF34	Saab & Fairchild SF-340	SF340	SF340
SH36	Short Brothers Shorts 360	SD330	SD330
SW3	Fairchild Merlin 3	CNA441	CNA441
SW4	Fairchild Merlin 4	DHC6	DHC6
T37	USAF Cessna T37 or 318	LEAR25	LEAR25
T45	PT6A-45AG	A7D	A7D
TEX2	Beechcraft T-6A Texan II	GASEPV	GASEPV
WW24	Israel 1124 Westwind	IA1125	IA1125

Attachment C

LETTERS FOR ALTERNATIVE AIRCRAFT SUBSTITUTIONS

HARRIS MILLER MILLER & HANSON INC.

15 New England Executive Park
Burlington, MA 01803
Tel. (781) 229-0707
Fax (781) 229-7939

TECHNICAL MEMORANDUM

To: Office of Environment and Energy, AEE-100
Noise Division, Room 900W
Federal Aviation Administration
800 Independence Ave SW
Washington, DC 20591

Cc: Mr. Michael Johnson
Northrop Grumman Information Technology
12005 Sunrise Valley Dr., MS 302
Reston, VA 20191

Michael Graham, Terry Thompson (Metron)
Christopher Bajdek (HMMH)

hmmh

From: David A. Crandall DAC

Date: May 5, 2005

Subject: Aircraft Substitutions Used in Noise Modeling for CLE/D21 Airspace Redesign Environmental Assessment - Supplemental Request

Reference: HMMH Project 299400.200

Metron Aviation, Inc. (Metron) in conjunction with Harris Miller Miller & Hanson Inc. (HMMH) is developing the noise section of the CLE/D21 Environmental Assessment. We are using the Noise Integrated Routing System (NIRS) version 6.0c2 for all aircraft noise modeling. Mr. Michael Graham's April 12, 2005 memorandum provides additional information regarding this project.

Please consider this memorandum a supplemental request to Mr. Graham's April 12, 2005 memorandum. In addition to the types specified in the previous memorandum, the noise modeling for this project will likely include operations of United States Air Force and Air National Guard F-16s; however, the NIRS model does not include these aircraft. As a result, we propose representing the F-16 operations with NIRS type A7D. The A7D is the only single-engine tactical aircraft available in the NIRS standard database.

We did consider importing F-16 noise and performance data from the Integrated Noise Model (INM), Version 6.1, in particular the F16GE and the F16PW9. Comparisons of SEL noise contours of the F19GE, A7D, and F16PW9, using INM 6.1 standard profiles, indicate that F16PW9 is 13 to 15 dB louder than the F16GE while noise values for the A7D values are in between the F16GE and F16PW9, edging closer to the F16PW9. The F16GE, F16PW9, and the F16A performance characteristics are defined in INM as profile points rather than procedures steps, and therefore NIRS could not modify the altitude profiles. Since the A7D is readily available in NIRS, NIRS can readily modify the A7D altitude profile, and since the A7D has noise values in between the F16GE and F16PW9, we recommend using the A7D to model all F-16 operations. In addition, the A7D was approved by AEE-100 to represent F-16 operations in NIRS for the Potomac Consolidated TRACON EIS.

Please let us know if you concur with our proposal or have additional comments or questions.

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

MAY 16 2005

Mr. David A. Crandall
Harris Miller Miller & Hanson, Inc.
15 New England Executive Park
Burlington, MA 01803

Dear Mr. Crandall,

Our office has reviewed the proposed aircraft substitution to be used in noise modeling for the *CLE/D21Airspace Redesign Environmental Assessment – Supplement Request* using the Noise Integrated Routing System (NIRS). Our review found the substitution of the A7D for all F-16 operations well-supported and suitable for use in the *CLE/D21Airspace Redesign Environmental Assessment – Supplement Request*.

Julie A. Draper
Manager, Noise Division,
Office of Environment and Energy, AEE-100

RECEIVED
MAY 20 2005
HARRIS MILLER
MILLER & HANSON INC.

TECHNICAL MEMORANDUM

TO:	OFFICE OF ENVIRONMENTAL AND ENERGY, AEE-100 NOISE DIVISION, ROOM 900W FEDERAL AVIATION ADMINISTRATION 800 INDEPENDENCE AVE SW WASHINGTON, DC 20591
CC:	MR. MICHAEL JOHNSON NORTHROP GRUMMAN INFORMATION TECHNOLOGY 12005 SUNRISE VALLEY DR., MS C302 RESTON, VA 20191 TERRY THOMPSON (METRON AVIAITON, INC.) CHRISTOPHER J. BAJDEK (HARRIS MILLER MILLER & HANSON, INC.)
FROM:	MICHAEL GRAHAM
SUBJECT:	AIRCRAFT SUBSTITUIONS USED IN NOISE MODELING FOR CLE/D21 AIRSPACE REDESIGN ENVIRONMENTAL ASSESSMENT.
DATE:	APRIL 12, 2005

Metron Aviation, Inc. in conjunction with Harris Miller Miller & Hansen is developing the noise section of the CLE/D21 Environmental Assessment. This is a National Airspace Redesign (NAR) project which covers the regions including both CLE and D21 TRACONS. We are using the Noise Integrated Routing System (NIRS) version 6.02c for all aircraft noise modeling. Note that NIRS version 6.0c2 is consistent with the Integrated Noise Model (INM) version 6.0c and therefore contains all of its supporting noise data. FAA Order 1050.1E requires AEE approval for use of non-standard data in noise impact analysis as part of an environmental document.

Attachment 1 provides a list of aircraft types without a direct NIRS substitution along with the suggested substitution to be used for this project. Along with the substitution is the rationale behind the choice. Accordingly, this document requests guidance or approval for the substitute aircraft types listed. If you have any questions regarding the document or its content please contact me.

Sincerely,

Mr. Michael Graham
Group Manager, Airspace and Environmental
Metron Aviation Inc.
131 Elden Street, Suite 200
Herndon, VA 20170
Office: 703.234.0764
Fax: 703.456.0132
Email: graham@metronaviation.com

Document Control #32F0405-001-R03

ATTACHMENT 1 – List of Proposed Aircraft Substitutions

A319, A320, A321

The Airbus A-319 and Airbus A-320 are both INM 6.0c aircraft types while Airbus A-320 is the substitute defined for the Airbus A-321. The CLE/D21 fleet includes 122 to 286 A319s, 114 to 178 A320s and up to 16 A321s(counts are based on 2006/2011 schedules).

In order to model these aircraft within NIRS they must have procedure step definitions. However, NIRS version 6.0c2 only contains departure procedure step information for the A-319 and the A-320 (arrival procedure steps are not defined). Hence, we propose using the A-320 departure procedure steps to model the A-321 departures and the 737300 as a substitute for the A-319, A-320, and A-321 arrivals. The 737300 has a similar noise category and weight as the A-319, A320, and A-321.

BEC40

A BEC40, Beech Beechjet 400/T-1 Jayhawk, is an INM6.0 aircraft type. The CLE/D21 fleet includes 30 to 32 BEC40s.

The standard INM database and official substitution list does provide guidance on modeling the BEC40. It has come to our attention that in future versions of INM, an update to the BEC40 substitution will occur and the MU3001 will be the new official substitution for the BEC40. Hence, we propose using the MU3001 as a substitute for the BEC40.

EMB170

An EMB170, an Embraer EMB-170/175, is an INM user defined type. The CLE/D21 Airspace fleet includes up to 42 EMB170s in the future fleet.

The standard INM database and official substitution list does not provide guidance on modeling such an aircraft. We propose using the CL601 as a substitute for the EMB170. The EMB170 has similar engines (GE CF34s) to the CRJ7 and CRJ9, with weights between the CRJ7 and CRJ9. Both the CRJ7 and the CRJ9 uses the CL601 as their official INM substitution. The CL601 has been approved as an INM6.0c substitution for the EMB170 for the Charlotte / Douglas International Airport (CLT) Part 150.

EMB190

The EMB190, an Embraer EMB-190, is an INM user defined type. The CLE/D21 Airspace fleet includes 16 EMB190s in the future fleet

The standard INM database and official substitution list does not provide guidance on modeling such an aircraft. We propose using the 717200 as a substitute for the EMB190. Though the EMB190 has engines similar to the E170 and the CRJ9, it is significantly heavier. The 717200 is more similarly weighted to the EMB190 without significantly increasing noise. Hence, using the 717200 as a substitute will be a conservative choice.

J328

A J328, a Fairchid Dornier 328JET, Envoy 3, is an INM user defined type. The CLE/D21 Airspace fleet includes approximately 12 to 26 J328.

The standard INM database and official substitution list does not provide guidance on modeling such an aircraft. We propose using the CL600 as a substitute for the J328. The CL600 has been approved as an INM6.0c substitution in the past on projects such as the Logan International Airport (BOS) ESPR, the Kent County International Airport (GRR) Part 150 NEM, and the Erie International Airport (ERI) Environmental Assessment.

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

JUN - 6 2005

Mr. Michael Graham
Group Manager, Airspace and Environmental
Metron Aviation, Inc.
131 Elden Street, Suite 200
Herndon, VA 20170

Dear Mr. Graham:

This is in response to your request for aircraft substitutions for NIRS version 6.0c2. Upon review of the aircraft submitted the following substitutions are recommended:

Aircraft	**Recommended NIRS/INM Substitutions**
A319, A320, A321	737300 (arrival procedure steps)
A321	A320 (departure procedure steps)
BEC400	MU3001
EMB170	GV
EMB190	GV
J328	CL600

I hope this satisfies your request.

Sincerely,

for

Julie Ann Draper
Manager, Noise Division
Office of Environment and Energy

Attachment D

ORIGIN/DESTINATION AND CUSTOM STAGE-LENGTH TABLES

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
ABE	CL600	1
ABE	EMB145	4
ACY	737N17	3
ACY	757PW	3
AGC	BEC58P	1
ALB	CL600	1
ALB	EMB145	4
ATL	737300	3
ATL	737N17	3
ATL	CL600	1
ATL	CL601	1
ATL	MD83	2
ATW	LEAR35	1
AUS	CL600	1
AUS	EMB145	4
AVP	DHC6	1
AZO	MU3001	1
BDL	737700	4
BDL	CL600	1
BDL	EMB145	4
BDL	MU3001	1
BHM	CL600	1
BHM	EMB145	4
BNA	737300	3
BNA	737700	3
BNA	A320	3
BNA	CL600	1
BNA	EMB145	4
BNA	EMB14L	3
BOS	737700	4
BOS	EMB145	4
BTV	CL600	1
BTV	EMB145	4
BUF	CL600	1
BUF	EMB145	4
BWI	737300	3
BWI	737700	3
BWI	757PW	2
BWI	757RR	5
CID	EMB145	1
CLT	737400	3
CLT	A319	2
CLT	CL600	1
CLT	CL601	1
CLT	EMB145	3

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
CMH	BEC58P	1
CMH	CL600	1
CMH	EMB145	3
CMH	MU3001	1
CRW	CL600	1
CRW	DHC6	1
CUN	737700	4
CVG	737N17	3
CVG	CL600	1
CVG	CL601	1
CVG	CVR580	3
CVG	DHC6	1
CVG	EMB145	1
CVG	LEAR35	1
CVG	MD83	1
CXY	BEC58P	1
CXY	DHC6	1
DAB	EMB145	4
DAY	737500	3
DAY	CL600	1
DAY	CNA441	1
DAY	EMB145	4
DCA	737500	3
DCA	737700	3
DCA	CL600	1
DCA	CL601	1
DCA	EMB145	3
DEN	737300	3
DEN	737500	3
DEN	737700	3
DEN	A319	2
DEN	CL601	3
DEN	EMB145	4
DFW	737700	2
DFW	CL600	1
DFW	CL601	1
DFW	EMB145	4
DSM	EMB145	2
DTW	A320	5
DTW	CL600	1
DTW	DC93LW	3
DTW	DC95HW	3
DTW	EMB145	4
ELM	CL600	1
ELM	DHC6	1

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
ERI	CL600	1
ERI	DHC6	1
ERI	EMB145	1
ERI	GASEPF	1
EWR	737300	3
EWR	737500	2
EWR	737700	4
EWR	757PW	3
EWR	757RR	3
EWR	IA1125	1
EWR	LEAR35	1
FLL	737500	3
FLL	737700	3
FNT	CL600	1
FNT	DHC6	1
FWA	CL600	1
FWA	DHC6	1
FWA	EMB145	1
GRR	CL600	1
GRR	EMB145	4
GSO	EMB145	4
GSP	CL600	1
GSP	EMB145	4
HOU	CL600	1
HOU	EMB145	4
HPN	CL600	1
HPN	EMB145	4
IAD	A319	1
IAD	CL600	1
IAD	CL601	1
IAD	EMB145	4
IAD	LEAR35	1
IAH	737500	3
IAH	737700	4
ILN	DC93LW	1
IND	737500	3
IND	A300	2
IND	CL600	1
IND	EMB145	4
ISP	CL600	1
ISP	EMB145	4
ISP	EMB14L	3
JFK	717200	1
JFK	EMB145	4
JHW	GASEPF	1

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
LAS	737500	4
LAS	737700	5
LAS	757PW	4
LAS	A319	2
LAS	A320	2
LAX	737700	5
LAX	757RR	4
LEX	EMB145	4
LGA	737300	2
LGA	737700	3
LGA	CL600	1
LGA	EMB145	3
LGW	757RR	5
LUK	BEC58P	1
MCI	737500	4
MCI	CL600	1
MCI	EMB145	4
MCO	737300	3
MCO	737700	3
MCO	EMB145	4
MDT	CL600	1
MDT	EMB145	4
MDW	737300	3
MDW	737500	3
MDW	737700	3
MDW	EMB145	4
MEM	A300	1
MEM	BAE146	1
MEM	CL600	1
MEM	DC93LW	2
MEM	EMB145	4
MGY	LEAR35	1
MHT	737300	4
MHT	737500	4
MHT	CL600	1
MHT	EMB145	4
MIA	737300	2
MIA	737700	3
MIA	CL601	1
MIA	EMB145	4
MKE	717200	2
MKE	CIT3	1
MKE	CL600	1
MKE	EMB145	4
MLI	EMB145	1

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
MSN	CL600	1
MSN	EMB145	4
MSP	737500	2
MSP	A319	1
MSP	A320	1
MSP	CL600	1
MSP	CL601	2
MSP	DC95HW	2
MSP	EMB145	4
MSY	737300	4
MSY	EMB145	4
MYR	CL600	1
OKC	EMB145	2
OMA	EMB145	4
ORD	737300	3
ORD	737700	3
ORD	757PW	3
ORD	A320	3
ORD	CL601	1
ORD	EMB145	4
ORD	MD82	3
ORF	CL600	1
ORF	EMB145	4
PA88	GASEPV	1
PBI	737700	2
PBI	EMB145	4
PBI	GIV	1
PHL	737700	2
PHL	CL600	1
PHL	CL601	1
PHL	EMB145	3
PHX	737500	3
PHX	737700	4
PHX	A319	2
PHX	A320	3
PIA	MU3001	1
PIE	A320	2
PIT	CL600	1
PIT	EMB145	1
PUJ	A320	4
PVD	737300	4
PVD	737500	4
PVD	EMB145	4
PWM	CL600	1
PWM	EMB145	2

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
RDU	737700	4
RDU	CL600	1
RDU	EMB145	4
RDU	LEAR35	1
RFD	A300	2
RFD	DC870	3
RIC	CL600	1
RIC	EMB145	4
ROC	737500	4
ROC	CL600	1
ROC	EMB145	4
RSW	737500	3
RSW	737700	4
SAT	CL600	1
SAT	EMB145	4
SBN	CL600	1
SBN	EMB145	3
SDF	737500	4
SDF	737700	4
SDF	A300	3
SDF	EMB145	4
SEA	737700	3
SFO	737700	4
SJU	737700	4
SRQ	EMB145	4
STL	737300	3
STL	737700	3
STL	CL600	1
STL	EMB145	4
SYR	CL600	1
SYR	EMB145	4
TOL	DHC6	1
TPA	737300	3
TPA	EMB145	4
TUL	EMB145	2
TYS	CL600	3
TYS	EMB145	3
UGN	LEAR35	1
UIN	CNA500	1
XNA	CL600	1
XNA	EMB145	4
YHM	GASEPF	1
YUL	CL600	1
YUL	EMB145	4
YYZ	737700	1

CLE 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
YYZ	CL600	1
YYZ	CL601	1
YYZ	DHC8	1
YYZ	EMB145	3

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
ABE	CL601	1
ABE	DC93LW	2
ABQ	A319	3
ABQ	A320	3
ACY	MD83	2
ALB	A319	2
ALB	BAE146	1
ALB	DC93LW	2
AMS	A310	5
AMS	A330	5
ANC	757PW	5
APN	CL601	1
APN	SF340	2
ATL	737300	3
ATL	737700	2
ATL	737N17	3
ATL	757PW	3
ATL	757RR	2
ATL	A320	3
ATL	DC93LW	3
ATL	DC95HW	3
ATL	MD83	3
ATW	BAE146	1
ATW	CL601	1
ATW	DC93LW	1
ATW	SF340	2
AUS	A319	3
AUS	A320	3
AUS	CL601	1
AVL	CL601	1
AVL	GV	1
AVP	CL601	1
AVP	SF340	1
AZO	BAE146	1
AZO	CL601	1
AZO	DC93LW	2
AZO	DC95HW	2
AZO	GV	1
AZO	SF340	2
BAK	LEAR35	1
BDL	A320	3
BDL	DC95HW	3
BDL	MU3001	2
BGM	CL601	1
BGM	SF340	2

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
BGR	BAE146	1
BGR	CL601	1
BHM	BAE146	2
BHM	CL601	1
BHM	DC93LW	1
BMI	CL601	1
BMI	SF340	2
BNA	737300	3
BNA	737500	3
BNA	737700	4
BNA	A319	3
BNA	BAE146	1
BNA	CL601	1
BNA	DC93LW	2
BNA	DC95HW	3
BOS	757PW	5
BOS	757RR	3
BOS	A319	2
BOS	DC95HW	3
BTV	BAE146	1
BTV	CL601	1
BTV	DC93LW	2
BTV	GV	1
BUF	A319	2
BUF	A320	2
BUF	CL601	1
BUF	DC93LW	2
BUF	DC95HW	2
BWI	757PW	4
BWI	757RR	3
BWI	A319	2
BWI	A320	2
BWI	DC93LW	2
BWI	DC95HW	3
CAE	CL601	1
CAE	GV	1
CAK	CL601	1
CAK	SF340	2
CDG	A310	5
CDG	A330	6
CGF	LEAR35	1
CHA	A319	1
CHA	A320	1
CHO	CL601	1
CHO	SF340	1

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
CHS	BAE146	2
CHS	CL601	1
CHS	DC93LW	2
CHS	DC95HW	2
CID	BAE146	1
CID	CL601	1
CID	SF340	1
CIU	CL601	1
CIU	SF340	1
CLE	A320	3
CLE	CL600	1
CLE	DC93LW	2
CLE	DC95HW	3
CLE	EMB145	4
CLT	737300	4
CLT	A319	3
CLT	A320	3
CLT	CL601	1
CLT	DC93LW	2
CLT	DC95HW	3
CMH	A320	2
CMH	BEC58P	1
CMH	CL601	2
CMH	DC93LW	2
CMH	DC95HW	2
CMH	GASEPF	1
CMH	LEAR25	1
CMH	LEAR35	1
CMH	MU3001	1
CMI	CL601	1
CMI	SF340	2
COS	A319	2
CRW	CL601	1
CRW	SF340	2
CUN	757PW	5
CUN	A320	4
CVG	727EM2	2
CVG	A320	1
CVG	BAE146	1
CVG	CL601	1
CVG	DC93LW	1
CVG	DC95HW	1
CVG	MD83	1
CWA	CL601	1
CWA	SF340	2

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
DAL	CL600	1
DAY	CL601	1
DAY	DC93LW	1
DAY	SF340	2
DCA	757PW	3
DCA	A319	2
DCA	A320	3
DCA	CL601	1
DCA	DC93LW	2
DCA	MD83	3
DEN	737300	4
DEN	757PW	3
DEN	A319	2
DEN	A320	4
DFW	737700	3
DFW	757PW	3
DFW	A320	3
DFW	MD82	3
DLH	CL601	1
DSM	BAE146	1
DSM	CL601	1
ELM	CL601	1
ELM	DC93LW	1
ELM	FA5090	1
ELM	SF340	2
ELP	A319	3
ERI	A319	1
ERI	CL601	1
ERI	SF340	2
EVV	CL601	1
EVV	MU3001	1
EWR	737700	3
EWR	A310	4
EWR	A319	2
EWR	A320	3
EWR	CL600	1
EWR	DC93LW	2
EWR	DC95HW	2
EWR	EMB145	4
FCO	A330	6
FLL	757PW	3
FLL	A320	3
FLL	DC93LW	3
FNT	A319	1
FNT	BAE146	2

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
FNT	CL601	1
FNT	DC93LW	2
FNT	DC95HW	3
FRA	A330	6
FRA	A340	6
FSD	CL601	1
FSD	SF340	2
FWA	CL601	1
FWA	SF340	2
FWC	CNA441	1
GRB	BAE146	2
GRB	CL601	1
GRB	DC93LW	2
GRB	DC95HW	3
GRR	757PW	2
GRR	A319	3
GRR	A320	3
GRR	DC93LW	2
GSO	A320	2
GSO	BAE146	2
GSO	CL601	1
GSO	DC93LW	2
GSO	DC95HW	3
GSO	GASEPF	1
GSP	A319	2
GSP	CL601	1
GSP	DC93LW	2
GYY	F10062	1
HKG	747400	7
HPN	A319	1
HPN	BAE146	1
HPN	CL600	1
HPN	CL601	1
HPN	DC93LW	2
HSV	BAE146	1
HSV	CL601	1
IAD	A319	1
IAD	A320	1
IAD	CL601	1
IAD	CNA750	1
IAD	DC93LW	2
IAH	737300	4
IAH	737700	5
IAH	757PW	4
IAH	A319	2

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
IAH	A320	4
ICT	CL601	1
ILN	DC95HW	3
IND	A319	2
IND	A320	3
IND	CL601	1
IND	DC1010	2
IND	DC93LW	2
IND	DHC6	1
IND	MD11GE	4
ITH	MU3001	1
JAN	BAE146	2
JAN	CL601	1
JAX	A320	2
JAX	DC93LW	2
JFK	717200	2
JFK	CL600	1
JFK	CL601	1
JFK	DC93LW	2
KIX	747400	7
LAN	CL601	1
LAN	DC93LW	2
LAS	727EM2	4
LAS	757PW	5
LAS	757RR	6
LAS	A319	4
LAS	A320	4
LAX	757PW	5
LAX	757RR	6
LAX	A319	5
LAX	A320	4
LAX	MD83	4
LBE	CL601	1
LBE	SF340	2
LEX	BAE146	1
LEX	CL601	1
LEX	DC93LW	2
LGA	757PW	5
LGA	757RR	3
LGA	A319	2
LGA	A320	3
LGA	CL600	1
LGA	CNA750	1
LGA	EMB145	4
LGA	GV	1

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
LGA	MD83	3
LGW	A330	5
LHR	777200	6
LIT	CL601	1
LNK	CL601	1
LUK	F10062	1
LUK	GIV	1
MBS	A319	2
MBS	BAE146	1
MBS	DC93LW	2
MBS	DC95HW	2
MCI	A319	2
MCI	A320	2
MCI	DC93LW	2
MCI	DC95HW	3
MCO	757PW	5
MCO	A319	4
MCO	A320	3
MCO	DC93LW	4
MCO	MD83	3
MDT	CL601	1
MDT	DC93LW	2
MDT	DC95HW	2
MDW	737300	3
MDW	737500	3
MDW	737700	4
MDW	757PW	3
MDW	A319	3
MDW	A320	3
MDW	DC93LW	2
MEM	A319	3
MEM	A320	3
MEM	CIT3	1
MEM	DC1010	3
MEM	DC1030	5
MEM	DC93LW	2
MEM	DC95HW	3
MEX	A319	3
MEX	A320	3
MHT	A319	2
MHT	A320	3
MIA	737700	5
MIA	A319	2
MIA	A320	4
MIA	CL601	3

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
MIA	MD82	3
MKC	CL600	1
MKE	757PW	4
MKE	A319	2
MKE	A320	3
MKE	DC93LW	2
MKE	DC95HW	2
MKG	CL601	1
MKG	SF340	2
MLI	CL601	1
MLI	SF340	2
MMU	FA5090	1
MQT	CL601	1
MQT	SF340	1
MSN	A319	3
MSN	A320	3
MSN	DC93LW	2
MSN	DC95HW	3
MSP	727EM2	2
MSP	757PW	5
MSP	757RR	6
MSP	A319	2
MSP	A320	3
MSP	DC93LW	2
MSP	DC95HW	3
MSY	A319	3
MSY	A320	4
MYR	A320	3
MYR	DC93LW	3
MYR	DC95HW	3
MYR	MD83	3
NAS	A319	2
NGO	747400	7
NRT	747400	7
OAK	757PW	4
OAK	A319	4
OKC	BAE146	2
OKC	CL601	1
OKC	DC93LW	2
OMA	BAE146	2
OMA	CL601	1
ORD	737700	6
ORD	757PW	5
ORD	A320	3
ORD	CL601	1

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
ORD	DC93LW	2
ORD	DC95HW	3
ORD	MD82	3
ORF	BAE146	2
ORF	CL601	1
ORF	DC93LW	2
ORF	DC95HW	3
PBI	A319	4
PBI	A320	3
PDX	A319	4
PEK	747400	7
PHL	757PW	2
PHL	A319	2
PHL	A320	3
PHL	BAE146	2
PHL	CL601	1
PHL	DC93LW	2
PHL	DC95HW	2
PHL	EMB145	3
PHX	737300	4
PHX	737700	5
PHX	757PW	5
PHX	A319	3
PHX	A320	4
PIA	CL601	1
PIE	A320	4
PIT	CL601	1
PIT	DC93LW	2
PIT	DC95HW	2
PIT	EMB145	4
PLN	CL601	1
PLN	SF340	2
POP	A320	3
PVD	A319	3
PVD	A320	3
PVD	DC93LW	1
PVD	MD83	3
PWM	CL601	11
PWM	DC93LW	2
PWM	DC95HW	3
RDU	A319	2
RDU	A320	3
RDU	DC93LW	3
RDU	DC95HW	3
RFD	A300	3

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
RFD	DC870	4
RIC	CL601	1
RIC	DC93LW	2
RIC	DC95HW	3
RNO	A319	4
ROA	CL601	1
ROA	SF340	2
ROC	CL601	1
ROC	DC93LW	2
ROC	DC95HW	2
RST	CL601	1
RSW	757PW	5
RSW	A319	4
RSW	A320	4
RSW	DC93LW	3
RSW	DC95HW	4
RSW	MD83	3
SAN	757PW	6
SAN	A319	5
SAT	A319	3
SAT	CL601	1
SAV	CL601	1
SAV	DC93LW	2
SAW	CNA441	1
SBN	CL601	1
SBN	SF340	2
SCE	CL601	1
SCE	SF340	1
SDF	A300	4
SDF	CL601	1
SDF	DC870	4
SDF	DC93LW	2
SDF	DC95HW	3
SDF	SF340	2
SEA	757PW	5
SEA	A319	5
SEA	A320	5
SFO	757PW	5
SFO	A319	4
SFO	A320	4
SGF	CL601	1
SHV	CL601	1
SHV	DC93LW	2
SJC	757PW	4
SJC	A319	4

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
SJU	A319	4
SLC	737300	4
SLC	737700	3
SLC	757PW	4
SLC	A320	3
SMF	757PW	4
SMF	A319	4
SNA	A319	2
SNA	A320	3
SPI	CL601	1
SPI	DC93LW	1
SRQ	A319	1
SRQ	DC93LW	2
STL	737700	4
STL	A319	3
STL	CL601	1
STL	DC93LW	2
STL	DC95HW	3
SWF	CL601	1
SYR	DC93LW	2
SYR	DC95HW	2
TEB	CNA750	1
TOL	SF340	2
TPA	757PW	5
TPA	A319	1
TPA	A320	3
TPA	DC93LW	4
TPA	DC95HW	4
TPA	MD83	3
TRI	CL601	1
TRI	CNA500	1
TRI	SF340	2
TUL	CL601	1
TUL	DC93LW	2
TUS	757PW	3
TVC	CL601	1
TVC	DC93LW	2
TVC	DC95HW	3
TVC	DHC6	1
TVC	SF340	2
TYS	BAE146	1
TYS	CL601	1
TYS	DC93LW	1
XNA	BAE146	2
XNA	CL601	1

DTW 2006 and 2011 Stage Length Table
CLE/D21 Airspace Redesign

Destination	NIRS Type	Stage Length
YHZ	CL601	1
YKF	CL601	1
YKF	SF340	2
YOW	CL601	1
YOW	DC93LW	1
YOW	SF340	1
YQB	CL601	1
YUL	BAE146	2
YUL	DC93LW	1
YUL	DC95HW	2
YVR	A319	4
YXU	CL601	1
YXU	FAL20	1
YXU	SF340	2
YYC	A319	3
YYZ	DC93LW	3
YYZ	DC95HW	2
YYZ	DHC8	1

Attachment E

NOISE INTEGRATED ROUTING SYSTEM - OVERVIEW

Noise Integrated Routing System (NIRS)

On September 14, 1990, FAA Notice 7210.360, "Noise Screening for Certain Air Traffic Actions Above 3,000 Feet AGL," was accepted by the Federal Aviation Administration (FAA). This Notice described the accepted methodology to examine high altitude noise impacts. The process outlined in this notice was subsequently converted to the Air Traffic Noise Screening (ATNS) computer model v.1.0 in 1995. This model was further revised to its current form (v.2.0) in early 1999. However, ATNS is limited in its application due to its ability to only examine one route at a time. The FAA recognized that airspace redesign projects would not only propose multiple high altitude air traffic changes, but also had the potential to create changes in noise levels at or below 3,000 feet Above Ground Level (AGL) due to more efficient use of existing arrival and departure procedures. It was also determined that the FAA's Integrated Noise Model (INM), which was designed to estimate noise exposure in the vicinity of an airport, was not well suited for projects involving multiple airports or en route traffic over large geographic areas.

The FAA wanted to create a program that built off of ATNS and INM, but was able handle the complex nature of airspace redesign projects. Hence, the FAA created a computer-based aircraft noise assessment program called the Noise Integrated Routing System (NIRS). In addition, the FAA designed NIRS to work in conjunction with other air traffic modeling systems that provide the source of routes, events, and air traffic procedures. NIRS is capable of evaluating complex air traffic applications involving high-altitude (up to 18,000 feet Above Ground Level) routing, broad area (typically thousands of square miles in size) airspace changes affecting multiple airports, and other airspace modification in the terminal and en route environments.

NIRS was initially developed in 1995 by the FAA's Office of Environment and Energy (AEE-120), in cooperation with ATC. In 1997, to validate the NIRS model, AEE-120 compared results from NIRS and INM. The unpublished FAA-internal comparison involved providing both models with identical inputs, and performing a detailed examination of the resulting outputs for representative jet, turboprop, and propeller aircraft for both arrival and departure operations. The models were found to give the same results in terms of both final noise values and intermediate aircraft state parameters (position, altitude, thrust, and speed). FAA's on-going NIRS Development and Support program ensures compatibility of the two models. Based on these results and on technical oversight of the NIRS development process, AEE-120 has approved the use of NIRS for airspace applications.

NIRS Version 1.0 was released in June 1998. For this project, NIRS Version 6.0c3 was used. This version of NIRS contains the noise computation engine of the INM version 6.0c.

NIRS has many characteristics that allow it to:

- produce an accurate screening evaluation of aircraft noise in airspace studies
- provides terminal and en route airspace noise analysis from ground level to high altitudes

- evaluate a large study area with multiple flight routes to/from multiple airports
- provide automated means of annualizing noise impact based on different operational configurations and/or runway usage statistics
- enable the user to specify air traffic control altitudes, and automatically calculate required aircraft thrusts and speeds necessary for noise using the same up-to-date database used for the FAA's INM
- evaluate a large number of grid points for locational noise analysis.
- have the ability to identify and map noise impact changes and identify the principal cause of the changes
- provide data for quantification of mitigation goals and identification of mitigation opportunities
- provide automated quantitative comparison of noise impacts across alternative airspace designs
- import and display track and operation data from airspace models, and population and community data from other sources.
- assemble tables and exhibits for noise-impact data analysis and report generation
- provide several layers of data checking and quality control

NIRS requires five categories of input data:

1. Flight events: flight identification, airframe/engine type, city-pair, time, runway, flight tracks, altitude controls along the track, and dispersion data associated with a specific track (number of dispersed subtracks, weight, and distance from the center track)
2. Configuration data: annual usage percentages for each operation configuration for each airspace scenario
3. Population and grid points: population centroid identification, location, and population count; grid location and spacing
4. Airport data: runway location (coordinate), elevation, and length for each airport
5. General data: study area (center, length, width, and cut-off altitude), climatological data (average headwind speed, temperature, and pressure), special regions

NIRS has the capability to follow specified altitude restrictions incorporated in the track and operational data. NIRS generates profiles for each aircraft operation on a specific flight track that are consistent with both the specified altitude and the aircraft performance database. When creating the altitude part of the flight track, NIRS uses the standard profile for aircraft below 3,000 feet Above Field Elevation (AFE). Hence, when a flight track contains points with altitudes greater than 3,000 feet AFE, the NIRS/INM standard profile is used up to 3,000 feet AFE and the user defined altitude after 3,000 feet AFE.

When creating the altitude part of a flight track, there are four altitude controls a user can use:

- No altitude control
- Fly to a specified altitude or higher,

- Fly to a specified altitude, and
- Fly to a specified altitude or lower.

Calculating thrust depends on whether the aircraft is climbing or descending and where the aircraft is along the route. NIRS uses the thrust settings required to fly the profile specified in the airspace design data when departures are below 10,000 feet AFE and arrivals and below 6,000 feet AFE. When an aircraft is ascending above 10,000 feet AGE, NIRS climb calculations use the maximum climb thrust. In addition, when an aircraft is descending and is greater than 6,000 feet AFE, NIRS uses a straight-line geometric descent as defined by the user.

NIRS contains the INM noise engine. Hence, NIRS core noise calculations are performed with the same algorithms employed by the INM. Also, NIRS is capable of computing the same noise metrics as the INM.

NIRS is able to output both population impact and change-of-exposure reports and graphics. Change of noise exposure for each point in the study area is evaluated based on FAA guidance and local requirements to determine the degree of the change in noise exposure. Also, where possible, NIRS identifies the principal source of the change of exposure. Study area points are typically defined as population centroids. Population centroids are center points of census blocks. Census blocks are statistical subdivisions of a county developed by the US Census Bureau.